

An experimental study of iconicity in the Arabic vocabulary of the Qur'an

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1.0 Introduction

This thesis begins with two interests: a personal desire to expand upon and apply modern scientific linguistic study to Muslim holy writ, and a more general desire to work with and study the growing field of *iconicity* in applied linguistics. As a Muslim, the Qur'an is a book close to my heart, and so, initially, when beginning, I had wished to complete a comprehensive series of iconicity experiments, studying large swathes of the Qur'an, utilising this Qur'anic stimuli for participant studies, administering entire verses of the Holy Book to non-Arabic speakers and analyzing their perception of linguistic iconicity from said verses. As the thesis moved along, it became clear even with a word limit of 40,000, this was impossible, thus, the paper focuses on not the entirety of the Qur'an, or even complete chapters or verses, but 100 words. The Qur'an is used as a text of study, but also a platform from which we compiled the stimuli for experimental work on, fundamentally, words from (Classical) Arabic, as they are found in the Qur'an from the 7th Century. That is the brief summary of how the thesis sculpted itself into what it is today, with a very specific substrate of stimuli studied. But now with this general outline in place, the questions remain, why the Qur'an? And equally saliently, what is iconicity?

The Qur'an is the Muslim Holy book, and the most memorized book in the modern world (Graham, 1993:80). What is perhaps more striking, and attractive for linguistic and philological study, is that the vast majority of people who have memorized the Qur'an are not fluent in Arabic, let alone the classical language that the text employs (Ariffin et al., 2000, 2015). The average Muslim who typically does not understand Arabic will attain proficiency in rote reading/reciting of the Qur'an in absence of semantic comprehension (Riddell et al., 1997). Despite the above, studies indicate the Qur'anic script is largely memorized with ease (Boyle, 2000; Slamet, 2019; Yusuf, 2010), with a number of studies finding the meaning vivid and easy to visualize for non-native speakers and readers (Boyle, 2006; Nawaz & Jahangir, 2015). Additionally, the Qur'an itself claims uniqueness in its stylistic marvel, its eloquence and its brevity (Armstrong, 1999; Lings & Barrett, 1983; Versteegh, 2014). There have been countless studies of the Qur'an in multiple languages, but what has not been done completely, is to apply modern applied linguistic methodology to the lexis that comprise the book. And so, whilst the idea of Qur'anic memorization or visuality will not be the focus of this paper, the ultimate goal of this thesis is to connect the Qur'an with one potential cause of these phenomena and its claimed linguistic marvel: *iconicity*.

In linguistics, broadly speaking, iconicity is the understanding that a word can ‘sound like what it means’, or more specifically that the form of a word can in some way resemble its meaning (Dingemanse et al., 2015; Perniss & Vigliocco, 2014; see Chapter 1.1 for a detailed definition). As such, the current paper is centred around the Qur'an and iconicity. Does iconicity, a concept that has been studied in Japanese, Korean, English, Dutch and other languages, exist in Classical Arabic? If so, to what extent? And how can iconicity in the Qur'an benefit the ones learning the Qur'an, or perhaps learning Arabic as a whole? These are the main questions that this paper asks and aims to address, namely through drawing on previous studies in linguistic studies of sound-symbolism, and motivated *by* the Qur'an, taking words *from* the Qur'an and placing them under the microscope for thorough linguistic analysis.

It should be clear now that the Qur'an is the subject of analysis insofar as iconicity research as modern empirical methods of iconicity research have not been applied to the Qur'an whatsoever. We will therefore learn something about this text first and foremost, but can then extend the findings to make comparisons between parts of speech and second-language vs native-speaker perceptions of iconicity. We see how different groups gauge iconicity in the Qur'an, and this then leads us to isolate specific words that are more iconic than others, which in turn can be tuned for language-learning of Arabic later down the line. The motivation to link these is that it allows for an objective analysis of some Qur'anic linguistic traits while also providing practical benefit to language-learners.

Chapter 1 will discuss previous literature in regards to iconicity as a phenomenon, with the aim of building a case for the existence of iconicity in the Muslim holy book. Chapter 2 and 3 will then move on to exploring a combined task-set constituting the present study of Qur'anic words: a pair of mixed-method experiments examining the extent to which iconicity is perceived by different groups of participants when present with Qur'anic words. The paper will conclude with Chapter 4, tying together how findings may be considered in light of other literature and how the study may inform our current understanding of both iconicity, iconicity testing, and the Qur'an.

1.1 What is iconicity?

1.1.1 Iconicity and Arbitrariness

Iconicity, also known as sound-symbolism (Dingemanse et al., 2015; Hinton et al., 1994; Lockwood & Dingemanse, 2012; though see Blake, 2017; Hoshi et al., 2019; Reay, 2006) is a concept centred around the understanding that words can sound like what they mean. Linguists attempt to study iconicity by considering the potential for words to carry some sort of meaning that can be understood to some degree even when someone who does not speak that language hears the word (Perniss & Vigliocco, 2014).

One manifestation of iconicity is in how ‘transparent’ a word is. Consider the onomatopoeic word *buzz*; even a non-English speaker can work out the meaning of this word due to the sound-symbolic qualities replicating the sound of a bee (though not all iconic words are necessarily easily guessable). *Arbitrariness* on the other hand is the opposite of iconicity¹. It is the idea that words are *not* inherently symbolic, or representative of that which they signify in the world. The concept of arbitrariness is typically associated with the language models of the linguist Ferdinand De Saussure (1916; 1959). According to Saussure, arbitrariness can be seen in the different words employed by different languages to denote the same thing, such as the word *house* in English. This word is *maison* in French and *bayt* in Arabic—all of which refer to the same thing. As there is no marked similarity between these words then, according to Saussure, this shows that these words are created arbitrarily to signify the same concept in our world.

Arguments of arbitrariness have been discussed since Saussure’s mentions in 20th century France. However, theories of arbitrariness in language stretch further back than even Saussure, and at least as far back as Plato.

In *Cratylus*, Socrates umpires a debate between two disciples: Cratylus argues that names carry meaning, and this meaning, to some degree, is intrinsic in the word; Hermogenes on the other hand contends that names are instead created through societal convention or other forms of deliberate creation and assignment. Hermogenes argues that a word does signify a certain concept or idea, but there is no *intrinsic* meaning value within the word. The word *chair* for example may signify a four-legged piece of furniture used for sitting, but there is nothing

¹ Though this dichotomy is not as black and white as it seems. Potential overlap(s) and grey areas will be discussed throughout this thesis.

intrinsic within the sign *chair* itself that carries this meaning—the word does not look or sound like a chair looks or sounds. In fact, other languages use words completely different to the English word *chair* to signify the exact same concept. This type of symbolic coding system (Peirce, 1931) creates form-meaning pairs that are thus considered arbitrary.

Saussurean theories regarding the arbitrariness of language have been expounded upon continuously and have been increasingly championed over the last century (e.g., see Dell and O'Seaghdha, 1992; Householder, 1971; Levelt et al., 1999; Waterman, 1956). As such, arbitrariness has for a long time now been accepted as a linguistic fact. But other studies have shown that language may not be quite as arbitrary as was once believed. Whilst there is undoubtedly an element of arbitrariness in language (though exactly *how arbitrary* is still a topic of debate) there has also been a growing body of evidence demonstrating *non-arbitrariness*, *sound-symbolism* or *iconicity* in language (e.g., see Dingemanse et al., 2015; Imai et al., 2008; Schmidtke et al., 2014).

1.1.2 A less arbitrary view

Iconicity has been increasingly discussed over the last few decades, with many studies contributing to this growing body of knowledge and study (e.g., see Auracher et al., 2010; Dingemanse et al., 2015; Gasser et al., 2005; Hamano et al., 1987; Huang et al., 1969). Yet arbitrariness in language has, previously at least, ‘eclipse[d]’ a satisfactory acknowledgment (Perniss et al., 2010) of non-arbitrary, *iconic* form-meaning mappings in language.

A prime example of iconicity is in the *kiki-bouba* effect. Some of the most frequently cited studies in the literature to relate to this phenomenon, illustrating the power of phonemes and graphemes; the first study into dates back to 1929 in which Köhler asked participants to match the pseudowords *Takete* and *Baluba* to either a spiked shape or a rounded shape. Whilst later studies adapted these stimuli into the words *kiki* and *bouba* instead, results have been largely consistent: researchers have found that there are cross-cultural associations of *Takete* or *kiki* with angular shapes and *Baluba* or *bouba* with rounded shapes (Bremner et al., 2013; Brown & Proulx, 2013; Brown & Nuttall, 1959; Davis, 1961; Maurer et al., 2006).

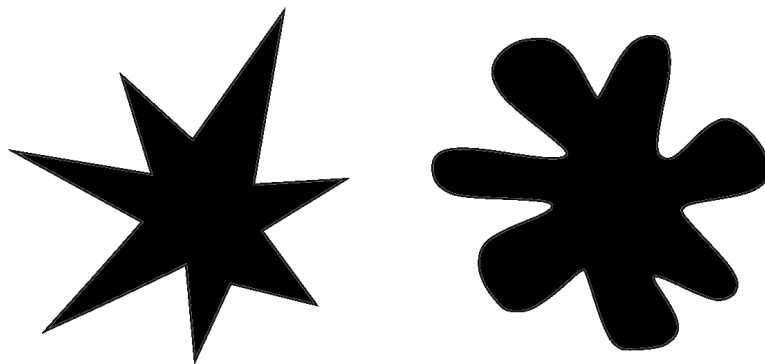


Figure 3 - Example illustration of *kiki* and *bouba*

Linguists have commented on this cross-cultural association, claiming that the /b/ phonemes in *bouba*, for instance, lend themselves to a mental mapping of roundness. Also, the back-vowels present may create a deeper, hollower sound that may be associated with roundness. The plosive nature of /k/ may create a sense of sharpness or ‘spikiness’. Just as /k/ is a plosive phoneme, the visual dimensions of a spike reflects this sharp rush of air from an orthographic perspective,

which may compound to the associations of spikiness in participants. When compared to each other, the letters *k* and *b* are angular and rounded, a potentially direct visual contrast of spikiness-roundedness that maps to the spikiness and roundedness of the shape-stimuli (Fort et al., 2015). This can be extended to the other letters within the word *biki* (its orthography being comparatively more ‘angular’ with the sharp *ks* and vertical *is*) vs. *bouba* (*ou* and *a* letterings appearing orthographically rounder than the sharpness of letters found in *kiki*).

The variety of experiments investigating this effect seem to have highly-acclaimed results and inculcated a lot of excitement in the linguistic community (Cuskley et al., 2017); Ramachandran and Hubbard (2001) conducted a seminal study on the kiki-bouba effect and reported 95% correct choice on the first participant encounter. Other experiments were extended to children, and Maurer et al., (2006) ran an experiment in which two-and-a-half year olds were also sensitive to the effect. Such findings suggest that the effects are not purely induced by the shape of the letters, as toddlers have minimal experience with such written linguistic variables (Ozturk et al., 2013). Clearly iconicity exists. Yet there is more to both iconicity and arbitrariness than originally meets the eye.

1.1.3 Arbitrary or iconic? A balancing act

At first glance then, it appears the many studies into the kiki-bouba effect have found high levels of correlating results: across cultures, participants make the same associations often thought to demonstrate clear iconicity, whether that be due to phonology or orthography, or both. However, there have been a growing number of criticisms in regards to the methodology employed during such experimentation. Ramachandran and Hubbard (2001) conducted a study on the kiki-bouba effect and reported 95% correct choice on the first participant encounter. However, the methods were ‘informally described’ (Dingemanse et al., 2016)—a critique reiterated by Monaghan et al. (2012), who replicated the study with a formalized detailed description of methods used, reporting a 55% correct choice on the participants’ first encounter.

Another important criticism relates to the design of binary-choice tasks as a whole. When participants in any study are presented with only two options (with minimal complexity and maximal distinction deliberately designed to contrast both linguistic stimuli) such a forced binary choice is not reflective of real-life spoken language (Dingemanse et al., 2016). Findings may not be generalizable to typical day-to-day speech, particularly as the stimuli used in many of these studies are pseudowords, again designed specifically for maximal difference between stimuli, be that in consonant voicing, vowel height, orthography (Dingemanse, 2012) or other variable. The methodology, findings and experiments as a whole would have greater ecological validity if stimuli were instead composed of words found in natural, spoken language as opposed to artificial or non-words (e.g., kiki/bouba).

Another problem noted by Lockwood & Dingemanse (2015) is that often, the presentation of stimuli can be exaggerated when pronouncing word-stimuli in such tasks, thus providing prosodic foregrounding which can facilitate participants’ choices. An alternative could therefore be to utilise pre-recorded stimuli which would be standardized across all tests and controlled for over-exaggeration or excessive prosodic influence.

Returning to arbitrariness, having grounded iconicity as a reality, we consider why for such a long period of time iconicity was dismissed by proponents of arbitrariness. It has been claimed that the dismissal of iconicity may stem from studies into arbitrariness historically focusing on Indo-European languages which themselves are often iconically impoverished (Perniss et al., 2010). Saussure himself, whilst acknowledging the existence of onomatopoeia, famously attributes that it was a historical accident and is a rarity in language (Hutchins, 1998).

However, studies into Saussure's native French indicate that the presence of onomatopoeia in the language at his time was comparatively low to many other languages (Callebaut, 1985) and his stance was dictated by his cultural and linguistic environment. Callebaut for instance found that 4% of bird names in 1916 French were onomatopoeic, and these findings were similarly low in other Indo-European languages around that time (7% for Dutch, and 13% for Flemish). Comparing this to non-Indo-European languages, approximately 39% of bird names appear onomatopoeic in Kaluli (Feld & Schieffelin, 1982) and as high as 49% in languages such as TzetItal Maya (Hunn, 1977). Saussure's dismissal of onomatopoeia (only one, albeit major, element of iconicity) as a rarity and historical accident was more a result of his own native French being iconically impoverished than being a fair criticism of language as a whole being universally arbitrary and lacking iconicity.

Previously, some scholars of iconicity had relegated the presence of arbitrariness, claiming it to not be pervasive, or at least not to the extent that it has been traditionally propounded (e.g., see Newmeyer 1992, relying on Whitney 1874). Yet, as acknowledged by the proponents of iconicity, arbitrariness exists (Dingemanse et al., 2015). As time has moved on, it has become largely accepted in the field that arbitrariness is prevalent in language just as iconicity is (Dingemanse et al., 2015; Lockwood & Dingemanse, 2015).

On the other hand, some classical proponents of iconicity have claimed, such as the Qur'anic scholar Shah Waliyyullah (2014), that if only the linguistic code could be broken, we would be able to decipher the iconic meaning of individual phonemes that constitute whole languages such as that of Classical Arabic².

This thesis adopts the now widely accepted view which agrees arbitrariness exists—but as does iconicity, and the primary aim of this paper is to make a case for iconicity, and more specifically, its presence in the Qur'an. Whilst this thesis will delve into some detail regarding iconicity as a subject, we must first draw classificational distinctions.

Studies into both signed and spoken languages indicate that iconicity can be found at differing levels (Dingemanse et al., 2015). Charles Sanders Peirce (1867) is the first to use the term 'icon' as it has now been taken up in its linguistic sense, with his original trichotomy of signs framework. This trichotomy, as proposed by Peirce, consists of *symbol*, *index* and *icon*.

² A morphemic code he believed he had in fact broken. He expounds upon this further in his seminal work, *Meaning of Qur'anic Abbreviations*, composed some time in the 18th century. The hypothesis has been further espoused by Georges Bohas (1997), who argues that each of the trilateral roots of Arabic words in fact stem from a biconsonantal root, and these all hold an individual semantic meaning. Bohas goes on to state that the use of three-consonantal root as the lowest level unit fails to capture substantial regularities in the Arabic lexicon, which can instead be uncovered at the single-consonant or double-consonant root (see Boudelaa & Masrén-Wilson, 2001).

- Symbols are signs born out of convention. They are as they sound—words or pictures without any direct form-meaning mapping, such as how it is mere convention that the word *table* refers to a table³.
- An index is a sign that is related to its object through position or causation; a finger may point to the position of something, smoke may index or point to the cause—fire.
- An icon is the most related to the concept it stands for. An icon comes in place of its object due to a quality or property that it possesses. A straightforward example is showing smallness with a pinching gesture. Iconicity at a more complex, metonymic level can also be found for instance in flags and other symbols; for instance, the red circle in the flag of Bangladesh stands in place of or represents the deaths in its historic War for Independence; this is on the backdrop of green, said to represent lush fields or the youth and fecundity of the deceased (Hulme, 2019; see *Figure 1*).



Figure 1 - The red disc in the flag of Bangladesh, an iconic representation of its bloody history

One categorization that will be important later is between *absolute* and *relative* iconicity in the linguistic sense (Gasser et al., 2005). *Absolute* iconicity is where there is a direct relation between form and meaning, such as with onomatopoeic words (*buzz*, *moo*, *quack*) or many symbolic gestures present in signed languages. *Relative* iconicity is a ‘weaker’ form of iconicity

³ Symbols are often described as arbitrary in that they are akin to Saussurean concepts of *signifier* and *signified*. Symbols, as understood in the Peircean trichotomy, should not be confused with *sound-symbolism* which is, conversely, the theory of inherent *iconicity* within words (see Ahlner & Zlatev 2010) and will be discussed in more detail later.

in which related forms are associated with related meanings, such when a difference in vowel-ing [i:a] depicts a contrast in magnitude and size, with [i:] depicting a smaller object, and [a] sounding much greater in size, as found in the words *teeny* vs *large* (Lockwood & Dingemanse, 2015).

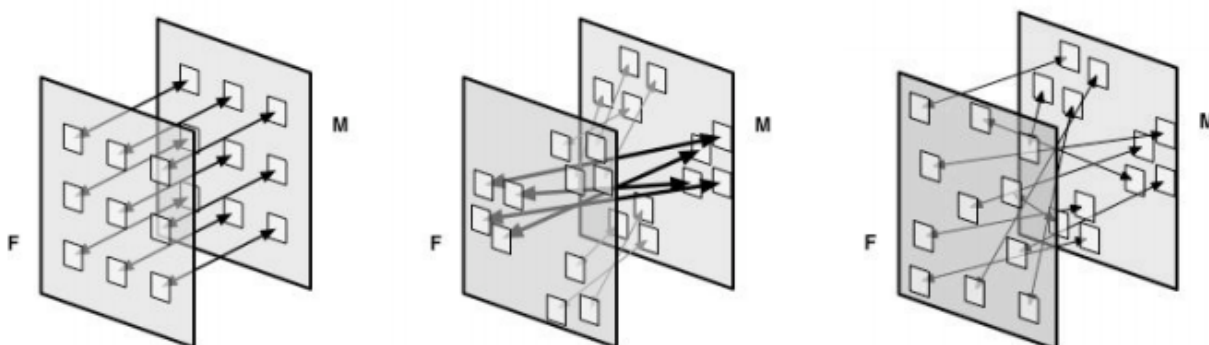


Figure 2 - *Absolute Iconicity (left), Relative Iconicity (middle) and Arbitrariness (right). Arrows indicate correspondence between form (F) and meaning (M), with perfect correlation in the Absolute Iconicity instance through to no form-meaning correlation found in Arbitrariness. Adapted from figures in Gasser et al. (2005).*

Having developed an understanding of arbitrariness and iconicity, we will now move on to discussing different *types* of iconicity. This thesis aims to bring together the literature of iconicity and some of the literature pertaining to the Qur'an, with the aim of building an experiment set to test for iconicity in the Qur'anic script; as such, the following chapters will provide a background to the literature of iconicity, and how powerful this iconicity in language can be.

1.1.4 Iconic Phonemes?

The *phoneme* is the smallest sound unit in our vocal inventory (Crystal, 2002). Phonemes make up every word we utter, and are thus a part of every language on Earth, but do they hold meaning? For researchers of sound-symbolism, the question regarding a phoneme's iconicity inevitably arises. Can a single sound-segment of a word, be that a consonant such as the /k/ in *cat* or the vowel /u:/ in *hoop* be capable of carrying meaning, and if so, can these potential carriers of meaning convey anything iconic to human beings, be they native or non-native speakers of a language? These are pertinent questions to our study into the Qur'an, and so the present chapter will aim to touch on but parts of the vast literature and shed some light on the expansive topic. To begin with, there are three phonemic phenomena that need to be discussed as they are particularly relevant to our study into Arabic: segmental phonemes, suprasegmental phonemes, and allophones.

1.1.4.1 Definitions for Phonological Concepts

Segmental phonemes change words. The minimal pair *cat* and *bat* have a difference in their initial segmental phoneme, which changes the entire word. In English, phonemes may seem to end there—but in reality, tone and stress can also change the meaning of a word just as much as a consonant can. The word *invite* in English can be pronounced in (at least) two ways; stressing the second syllable gives a verb meaning, whilst stressing the first syllable gives a noun. This is an example of phonemic stress. Suprasegmental phonemes are similar in that they perform a similar function. With suprasegmental phonemes, differences in tone, stress, nasalization and vowel harmony (amongst other aspects) entirely change the meaning of a word as can be found in many languages. Particularly in tonal languages, such as Mandarin Chinese, differences in tone and pitch can completely change the meaning of a word. The word /mā/ means *mother* as it contains a high pitched vowel; /má/ with a rising pitch means *hemp* and /mǎ/ with a falling then rising pitch means *horse*. Similarly, in languages such as Arabic, tone and pitch can alter the meaning of a word.

Speech sounds, or *phones* can sometimes change the meanings of words, and sometimes not. The /k/ in *kit* is aspirated, whilst the /k/ in *skill* is not. This does not make much difference in English, so native English speakers consider both the phones [k^h] in *kit* and the [k] in *skill* to

both constitute one phoneme: /k/. They are both *allophones* of a single phoneme. They are different *phones*, but not different phonemes. However, if the phone /k/ was to change to /t/ (e.g., *skill* to *still*), because the meaning has changed, this illustrates /t/ is a different phoneme.

Allophones in one language are not necessarily allophonic parts of the same phoneme in another. In Arabic for example, there are two phonemes for what in English is the /k/ sound. In Arabic the uvular /q/ as found in the word *qalb*, and the traditional velar /k/ (as in the English word *cat*). When these phones are switched in English, there is no difference in meaning, although it may sound odd (imagine *cat* being pronounced with a harsh /q/ sound—the meaning is still more or less the same albeit sounding strange). But when the velar /k/ is used in Arabic the word *qalb*, *heart* turns into *kalb*, *dog*.

In English these sound units are considered *allophones* (different phones constituting the same phoneme). However, in Arabic, they are two entirely different *phonemes* that completely change the meaning of words.

1.1.4.2 How phonological concepts relate to iconicity

The above points are most salient when considering studies conducted on phonemes across European, Western or non-Semitic languages more generally. For instance, studies have found different pleasantness ratings across phonemes. Studies conducted on the pleasantness of /p/ for example would be ungeneralizable to Arabic in which the /p/ phoneme does not exist (and when it does, such as in MSA, it is an allophone of /b/; see Watson, 2002). Similarly, findings in Arabic, a language which employs a largely different inventory of phones and sound structures compared to non-Semitic languages (Butts, 2011), can not be directly compared to other languages that have been typically studied in the literature; this is due to the makeup of the Arabic alphabet and phoneme inventory, and the non-existence of some phonemes in other languages—consider the *qalb/kalb* distinction mentioned earlier for example. As a result of this, many studies of particular phonemes cannot be generalized to Arabic, nor vice versa.

The final two subchapters in Chapter 1.1.4 aim to build an understanding of how iconic phonemes are found across languages, and have the potential to portray pleasantness, emotional tone, and even size/shape.

1.1.4.3 Iconic Phonology: (Un)pleasant phonemes

There has been an increasingly large body of work looking at our *perception* of linguistic units such as of words and phonemes (e.g., Albers, 2008; Wiseman and van Peer, 2003). A number of studies have used valence ratings (e.g., Warriner et al., 2013). *Emotional* valence, for example, is a term used to describe how happy a word makes people feel. In their study of 13,1915 valence norms, the words *pedophile* and *fantastic* held emotional valence scores of 1.26 and 8.36 respectively (a score of 1 indicated least happy, and 9 most happy with an average rating of 5.06 across 303,539 observations). Clearly, different words can induce different levels of happiness in people. One hypothesis is that perhaps some words are rated as more or less emotionally valent due to the phonemes that comprise the word. And extending this more broadly, it may be that the phonemes that make up a word can induce a feeling of pleasantness/unpleasantness.

Two of the most seminal studies in phoneme pleasantness were conducted by Wiseman and van Peer (2003) and Albers (2008). Both found a relationship between plosive sounds (p, t, d, b) and feelings of happiness, as well as a consistent mapping between nasal sounds (such as n, m) with negative feelings. Wiseman and van Peer (2003) also found a significant difference in both German and Portuguese speaking participants for nasal (m, n) and plosive (p, b, t, and d) sounds, with nasal sounds typically being matched to expressions of sadness, and plosive sounds to happiness. One criticism (see Auracher et al., 2010) of the Wiseman and Van Peer finding however is that the consistency can potentially be explained by both German and Portuguese being part of the Indo-European language family and thus sharing much of the same inventory and historical roots. However, both Albers (2008) and Auracher et al., (2010) go on to say that these findings regarding plosive/nasal phonemes are universal, and independent of specific language or families. Evidence for this, Auracher and colleagues claim, can be found in poetry, where phoneme usage is calculated and expertly chosen. The ratio of plosive to nasal sounds in a real-world poem has been found to predict the emotional tone perceived by readers (Auracher et al., 2010): highly plosive poems are perceived as happier, and highly nasalised poems more sad in comparison.

Poetry analysis aims to focus on real text as opposed to pseudowords or artificial word material. Fónagy (1961) analyzed poems categorized as either aggressive or tender, finding that plosives such as /k/ and /t/ tended to occur in more 'aggressive' poems, and sonorants such as

/l/ and /m/ tended to occur in more tender, less aggressive poetry. Findings such as Fónagy's however are not necessarily universal.

Auracher et al. (2010) aimed to avoid the subjectivity that naturally arises when interpreting a text. They instead compared phoneme perception in Ukrainian, Russian, Chinese, and German participants using a more empirical approach, based on the native language of the participant. German participants rated highly nasalized poetry as more quiet and calm. Chinese participants on the other hand showed very little difference between the two poles of dimension, illustrating that participants' native tongue plays a major factor in the perception of phonemes.

Similar participant differences were found in Taylor & Taylor (1965) study, which asked monolingual participants to rate pseudowords for pleasantness. The pseudowords were composed of phonemes found present in all four of the languages of study: English, Korean, Japanese and Tamil. They found that ratings were largely different across languages, yet highly consistent within participant groups speaking the same language. It appears that perceptions of pleasantness (and possibly other iconic qualities of phonemes) appear to be learned in a certain linguistic context, i.e., within that language community, and cannot necessarily be predicted in another community. This can affect findings in the field of iconicity, as what is considered iconic in one language may not be considered iconic in another, and more so if the perception of pleasantness/unpleasantness in the constituent phonemes is different between those language communities.

The studies mentioned thus far suggest there is a universal tendency to express happy and active feelings with plosive sounds, and sad and passive feelings in nasal sounds. To what degree this universality is found in Qur'anic Arabic will be investigated, and make up one of the research questions in the current study.

1.1.4.4 Iconic Phonology: Sound, size and phonemic symbolism

There have been a number of studies that have looked at the effect of different phonemes on the perception of size, hardness, masculinity/femininity, speed and other variables (Klink, 2000; Klink, 2002; Ohtake & Haryu 2013; Ultan, 1978; Monaghan & Fletcher, 2019). Experiments analysing variables of pitch, vowel quality and voicing have all found that subtle changes can have demonstrably large iconic effects. This chapter will touch on some of these possible effects:

perceptions of smallness and largeness, softness and heaviness and even slowness and quickness—all due to changes in the phoneme.

Sapir (1929) found that participants thought that nonce words with high-front vowels such as ‘mil’ were associated with small objects in contrast to nonce words with low-back vowels such as ‘mal’. In a series of follow-up studies, researchers gathered similar results (e.g., see Ohala, 1994; Ultan, 1978; Walker, 2016). Thompson (2013) conducted an experiment in which participants had to match pseudowords to objects of varying size. Each nonword contained three syllables and varied the amount of front-vowels and back-vowels. Results showed that participants consistently matched the words with more front-vowels to the smaller objects, and the back-vowels to the larger object. Such findings were consistent in a study conducted on three-year-old Spanish children (Peña et al., 2011); the looking task measured the duration of time that the toddlers would look at different geometric shapes that differed in size. Whilst being presented with words that contained differing syllables contained both front/back-vowels, researchers found that when the children were presented with syllables that contained front-vowels (e.g., ‘di’), they tended to look at the smaller objects for longer, and conversely, when presented with syllables containing back-vowels such as ‘da’, the infants looked at the larger objects for comparatively longer durations of time. Thus the results from the two-way preferential looking paradigm (Imai & Kita, 2014) seem to indicate that even as early as three-years-old, human beings associate the front-vowel with smallness and the back-vowel with concepts of largeness.

Another area of research has been the acoustic components of pitch and sound and their bearing on iconicity (see Dacremont, 1995; Dijksterhuis et al., 2007). Proposing the Frequency Code Hypothesis, Ohala (1994) explains that our association between deep sounds and concepts of largeness follows the ineluctable human observation that large objects (due to their resonance body) create low-frequency sounds in comparison to smaller objects. Our modes of communication facilitate this as a non-arbitrary mapping between contrasts of size and phonemic contrasts that mirror this difference in frequency.

The effects of contrasts in pitch are not limited to purely mapping differences in size. Vickers (1984) discusses how the word *crispy* is often used to describe food items that create a higher pitch when they are chewed, whilst the word *crunchy* describes food items that create a lower-pitched sound when chewed. The acoustic qualities present in the high and low-vowels create a mirror of the high frequency to low frequency acoustics found in *crispy* and *crunchy*

words, and thus the descriptors themselves can be seen as highly iconic of that which they are signifying (also see Chapter 1.1.5 for more discussion on the effects of pitch).

Berlin (2006) found that there is a consistent sound-symbolism found across 17 languages of indigenous South American tribes. He found that bird size corresponded to vowels in onomatopoeias for bird sounds or the names of those birds. For instance, tinamous and rails are two species of birds that share phonetic similarities in their labels/names across many languages. Tinamous are comparatively more round than rails, which are sharper and more angular in appearance. Across these languages, the words for tinamous would consistently contain nasal consonants (thought to connote slowness, roundness, fatness, softness and heaviness; Imai & Kita, 2014), whilst the words for rails would tend to include a /t/ or /k/ plosive consonant, thereby vocally symbolising the more sharp figureset of the birds.

Monaghan & Fletcher (2019) conducted a study that compared phoneme features (e.g., *voicing*: the difference between /s/ and /z/, where the vocal folds vibrate when voiced) and individual phonemes for comparative perceptual judgements. The paper aimed to build on the work of Klink (2000, 2001, 2003) which showed that fricatives were more likely than plosives to relate to concepts of smallness, lightness, and femininity, whilst voicing was related to largeness, and masculinity, results that were confirmed in follow-up studies (Klink & Athaide, 2012; Klink & Wu, 2013).

Monaghan & Fletcher (2019) predicated that plosives and voicing relate to properties of largeness, hardness, slowness and masculinity, as there had been previous evidence (e.g., Hinton et al., 1994) that fricatives and non-voiced consonants created a converse effect, in which they were perceived as higher in frequency than plosives and voiced consonants.

With a concentration on the semantic attributes of small/large, soft/hard, fast/slow, and masculine/feminine, they found that velar points of articulation as well as voicing tended to relate to concepts of largeness, similar to previous findings by Klink (2000, 2001, 2003). The phonemes /b/ and /g/ were also found to relate to concepts of largeness, with /p/ and /t/ relating to smallness. It can be seen that /p/ and /b/ which differ purely in voicing as opposed to place of articulation, both related positively to largeness. The authors posit then that the voicing effect appeared to be specific to only some phoneme contrasts. Insofar as concepts of softness and hardness, again the features of velar and voicing related positively to hardness, along with the phonemes, /g/, /k/, and /z/. The phonemes /f/ and /s/ related positively to softness which were also in line with similar findings by Klink (2000). For differences of fast and slow speed, no phoneme features related significantly to slowness, but for the individual phoneme model, /v/

and /z/ related positively to fast speed, whilst the phonemes /b/, /d/, and /s/ showed trends of slow speed.

With the multiple categories of results borne in mind, Monaghan and Fletcher propose that previous observations of differences in contrast such as that of hardness/softness or fastness/slowness appear to in fact be driven by particular phonemes rather than phoneme features. No doubt there are instances where contrasts in phonemic quality or feature can lead to a demonstrable change in perception, and previous literature indicates this, but rather the argument made is that it is less the contrast that is the cause as is the individual phonemes that are iconic and create sound-symbolic mappings.

In Chapter 1.1.4 we have considered how phonemes and iconicity tie together. The phonemes present within words, as well as how a word is uttered can influence perceptions of pleasantness, perceptions of size and even influence perceptions of roundedness and sharpness, as seen in the kiki-bouba effect. What many of the words we have discussed so far hold in common is that they are often collectively considered *ideophones*. The concept of ideophones is pivotal for any discussion of iconicity, and ideophones as a whole have become an increasingly popular point of discussion within iconicity in recent decades. Chapter 1.1.5 aims to shed light on what ideophones are, how they are composed of many of the qualities we have discussed thus far, and how they relate to our subject of study. Many of the words in the Qur'an contain words that have been previously identified in varied literature sources as iconic. The following section on ideophones is particularly significant as it allows us to focus on iconicity in natural vocabularies, as opposed to pseudowords that may not be representative of real language.

1.1.5 The Iconicity of Ideophones

Ideophones, also known as *expressives* or *mimetics* are marked words depictive of sensory imagery, noted for their special sound patterns, distinct grammatical properties, and sensory meanings (Dingemanse, 2012). They can be found in many languages, such as Japanese, Dutch, African languages and others (Dingemanse et al., 2015). Ideophones are significant because they are representative of real-world sound-symbolism in natural vocabularies, as opposed to pseudowords (e.g., kiki-bouba). In fact, in some languages, ideophones constitute their very own class of words, such as in Japanese—with one dictionary of Japanese ideophones listing over 4500 entries (Ono, 2007). They can serve many different functions, such as intensification, communication of sensory meanings (Dingemanse, 2012), and they often have the ability to modify (other) grammatical classes such as verbs, adjectives, and noun phrases (Mamet, 1973:912). After surveying ideophones, we will begin to have an understanding of what it may take to locate ideophones in the Qur'an for potential study and to test for iconicity.

So what does an ideophone look like? Ideophones are iconic words that bring together the different points made in previous chapters regarding phonemes carrying meaning within words. A few characteristics of ideophones as mentioned by Dingemanse (2012) include their ability to be reduplicated without detriment to semantic meaning (such as *woof* vs. *woof woof*; reduplication as a phenomenon is found in a large number of the world's languages—see Spencer 1991: 150-6); ideophones can be lengthened ([mu] vs. [m:u:]); ideophones are also not syntactically bound in the traditional sense: they can appear at the end of a phrase, be separated from the phrase by a pause, and occur as a freestanding utterance (Nuckolls, 1999).

Some of the cross-linguistically recurrent iconic patterns found in ideophones include repeated forms depicting repeated or iterative events (e.g., *gorogoro* meaning rolling in Japanese), contrasts between vowels such as [e:o] depicting contrasts in magnitude (e.g., *legee* meaning slim, *logoo* meaning fat in Ewe), and voicing contrasts such as [k:g] depicting contrasts in size (Perniss et al., 2010; e.g., in Japanese, *gorogoro* means a *large* object rolling down a hill, *korokoro* means a *small* object rolling—the difference in voicing functions as a mapping of size contrast).

The next question to consider is where they can be found. Ideophones are interesting phenomena, and whilst claimed to be a near-universal feature of human language (Kilian-Hatz,

2001), they are not traditionally attested to in languages Indo-European languages such as English (Nuckolls, 1999; Schmidtke et al., 2014). Wescott (1977) argues however that ideophones are not totally absent from western European languages, with onomatopoeic words and expressions such as *click*, *thwack*, *moo moo*, *baa baa* and others being used as chief examples (Nuckolls, 1999).

Experiments on the perception and guessability of ideophones across languages have generally shown that participants who do not speak the language in question can identify the meanings of ideophones (e.g., Alpher, 2001; Huang et al., 1969; Imai et al., 2008). Maltzman et al. (1956) found that adults and children alike can identify novel Japanese ideophones (or mimetics) and match them to their corresponding meanings. Kita et al. (2010) ran a study in which English-speaking adults with no knowledge of Japanese were able to guess which ideophones were to be used for which type of event (e.g., rolling or jumping) at levels above chance. Pitch and tone are also an important element in ideophonicity, for instance, voiced consonants and a deeper pitch are often found to exhibit meanings connected to heaviness and largeness (Imai & Kita, 2014), whilst the opposite is found for voiceless consonants and higher pitches (e.g., *gorogoro*—voiced, vs. *korokoro*—unvoiced). Such form-meaning relationships are not always fully productive, but rather are shared among many ideophonic words (Perniss et al., 2010).

Dingemanse et al. (2016) presented 203 ideophones from five languages (Semai, Siwu, Ewe, Japanese, and Korean) to eighty-two Dutch listeners in a binary-choice task, with participants guessing the meaning of words at rates above chance in all experimental conditions, supporting the natural iconicity hypothesis of ideophones. The study deliberately isolated a variety of factors when presenting ideophones to participants. One strong indication was that prosody and other forms of communication appeared to add to the perception of iconicity: performance was not uniform across semantic domains, and the ‘results owe as much to prosodic implementation as to segmental information’. The findings revealed that various factors, such as segments, prosody, gesture all help to bolster the iconic potential. The study concluded that ideophones were thus not direct phonetic representations of meaning (referred to as ‘strong iconicity’) but rather combined a large degree of arbitrariness with ‘weak iconicity’: in other words, the form alone was not enough to fully predict meaning, but given form, prosody, gesture and other multimodal variables, iconic correspondences were predictable. From this it can be understood that whilst ideophones may appear inherently iconic, this may often be down to other (not so easily discernible but nonetheless) concomitant factors such as

intonation, duration and prosody which amplify the iconic realities to native and non-native speakers.

Ideophones are not a perfectly defined class of words. In fact, there is no definitive definition of an ideophone (though see Dingemanse, 2012 for a very good definition). There appears to be a spectrum with more central members e.g., onomatopoeic words and more peripheral members that are less agreed upon amongst linguists.

Reduplication is one of the most common features amongst ideophones, particularly in African languages (Samarin, 1965), Japanese and Korean (Lee, 1992; Thompson et al., 2020). In Gbaya for instance, reduplication can depict motion and visual scenes: *loboto-loboto* means 'large animals plodding through mud', *kilán-kilán* means 'in a zigzagging motion', *pedeη-pedeη* means 'razor sharp' (Noss et al., 2001). Arabic, being a Semitic language, poses interesting questions insofar as the possible existence of ideophones: the traditional reduplication present in many ideophones in other languages do not serve the same function in Arabic, though reduplication does exist. Almost all reduplicated adjectives in Semitic are qualitative adjectives—a semantic group traditionally interpreted as intensives, which mark a heightened degree of strength, depth or intensity (Butts, 2011). In Arabic, reduplication appears purely as an intensive or as a function of gemination (El Zarka, 2005), though typically in linguistics reduplication is morphological and gemination is phonological.

This is an important point as qualities such as reduplication are not necessarily a requirement to be an ideophone, but rather a common feature. One might argue that *bang* is an English ideophone, containing no reduplication whatsoever. Whilst not all ideophones will contain reduplication, the prototypical ideophones may⁴. Highly-prototypical ideophones will exhibit many of the features of ideophones; this can include the features of being reduplicated, exhibiting unusual phonotactics, containing sound-symbolic patterns, participating in a system congruent with other ideophones, having meanings that tend to be encoded by ideophones, and so on. Granted, not all ideophones will have all of these features and it is understood that ideophones are not strictly compositional but rather a degree of how ideophonic a word appears to be. In a sense it can be said to this day there is contention on what exactly an ideophone is and where the boundaries should be drawn.

⁴ This is also language-dependent. In African languages for instance, ideophones have a completely different morphology compared to, for example, Japanese, with some languages containing ideophones that can take affixes, whilst others cannot—some that can be conjugated, whilst others cannot (see Nuckolls, 1999).

Similar to English, Arabic has not typically been attested to have an abundance of what Dingemanse and others in the field would define as a prototypical ideophone (Owens, 2004). This being said, there are common features and/or variables found within ideophones that can be found in Arabic. Of these, variables of multimodality are important to consider, not only because they relate to ideophony but also as more general features of iconic communication. The following sections will touch on such features of multimodality which are found in ideophones but which are also iconic in their own right. This is particularly important as multimodal qualities can also be found in non-ideophonic words and are thus present in languages that are not rich in ideophones.

1.1.5.1 Making an Ideophone: Multimodality

Gestures are another communicative phenomenon that exhibit iconicity. When communicating largeness, one may use hand gestures as one of the modes to express great size (see *Figure 4*). Similarly, in the word 'huuuuuge' there may be elongation of vowelizing which can symbolize largeness, and the intonation may also be modified by the speaker. All of these are modes of expressing iconic values.



Figure 4 - Hand gestures are one of the multiple modes of expressing smallness and largeness

Just as there is not one single factor that makes the above example more symbolic than a usual utterance, the argument presented in the current subchapter is that ideophones are not demonstrably iconic simply for any one 'arbitrary' reason. Rather, iconic words are what they are, not so much because of a single inherent linguistic quality that differentiates them from other words, but due to the combination of many: ideophones as the prime example are the sum of many iconic characteristics that do not typically combine in a single word: qualities pertaining

to duration control, pitch control and reduplication amongst other factors which can augment the perceptual, communicative content. Whilst briefly introduced earlier, Chapter 1.1.5.2 will discuss these three qualities in detail and their relation to ideophones and iconicity.

1.1.5.2 Making an Ideophone: Duration, Pitch & Reduplication dissected

The current subchapter will discuss in further detail the effect of duration (primarily lengthening of vowels) and gesture in conjunction to pitch, touching upon how they can make a difference to the already profound effects caused by changes in pitch.

Researchers have found that when we as humans wish to indicate extreme largeness, consciously or subconsciously, people often use deeper, back-vowels (Dijksterhuis et al., 2007; Imai & Kita, 2014; Peña et al., 2011). The back-vowel used creates a deep, resonating sound: it sounds even ‘larger’ due to the fact that it is extended, for this extends the portrayed pitch-size mapping. However even in the absence of such extension, when pronounced with a back-vowel, ‘huge’ sounds larger and more threatening than words with frontal vowels. Compare this to the word ‘teeny’ which uses the front-vowel and many studies have found sounds ‘smaller’ due to the different pitch vowels in question (Ohala, 1994; Ultan, 1978; Walker, 2016). The observation that vowel position relates to small versus large across languages has been interpreted as due to differences in perceptions of pitch between front and back-vowels (Monaghan & Fletcher, 2019). For instance, the phonetic lengthening of the adjective ‘huge’ to ‘huuuuuuge’ creates a more salient perceptual effect—compare to this how in Siwu, unitary events tend to be expressed with monosyllabic forms, and the addition of a lengthened vowel evokes a unitary, but durative event (Perniss et al., 2010). Such lengthening of the deep vowel is in essence another form of iconicity (Winter, 2019a), named either *iconic prosody* or *vocal gesture* (see Perlman & Cain, 2014; Perlman et al., 2014). Iconic prosody, whether it be indicative of contrasts in size or time, can be thought of as perceptual imagery communicated via vocal production (Winter, 2019a).

Reduplication is often found present in ideophones. Whilst there is not a considerable amount of reduplication in the Qur'an insofar as ‘double segment’ (Butts, 2011) reduplication (e.g., *gorogoro* in Japanese where the segment of *goro* within the word is doubled), there is the concept of *gemination* in the Qur'an. Gemination is typically a purely phonological phenomenon, but in Arabic, gemination also comes with a meaning contrast. In Arabic, the third-person masculine past-tense verb *daraba* means ‘he hit’. One can reduplicate the verb in

noun form to create *daraba darban*, meaning ‘he hit, a [significant] hitting’. This gemination of the verb with a verbal noun (*darban*) gives rise to emphasis and intensity of hitting, and is a syntactic phenomenon that was once employed frequently in classical Arabic works—although gemination/reduplication is used less in contemporary spoken Arabic. It is now (as with many classical literary tropes and rhetorical devices across languages) often unused, relegated as an archaic literary rhetorical device. This being said, classical Arabic such as that found in the writing of the Qur'an employ geminate reduplication frequently. Some linguists do note however that the only semantic function of *Arabic* reduplication is intensification (Procházka, 1995) in the form of gemination, as opposed to the many functions of prototypical ideophone reduplication in other languages.

Clearly ideophones are a complex, multifaceted phenomenon closely tied to any meaningful study of iconicity and sound-symbolism. Whilst the existence of ideophones in Arabic will be considered in detail throughout the thesis, the current question remains: what makes an ideophone an ideophone? If the particular characteristics can be pinpointed, this would allow for a case for or against their existence in Classical Arabic, a discussion central to the present paper.

So far, we have discussed how phonemes, pitch, duration and many, many other factors can all contribute to creating an iconic word. When considering ideophones, they are not clearly defined, and by their very nature, never will be. They are, at their core, words that have a high propensity to evoke vivid sensory-motor imagery (Dingemanse, 2012). However, this is not a single, unitary well-defined class. There can be gradations, with some words that are clearly ideophones and others that are not. Considering this spectrum, in Arabic, it is not that ideophones do not exist, but rather they may not follow the conventional, prototypical norms of ideophones in many other languages, thereby presenting a greater challenge in identifying the Arabic ideophone.

Iconicity is clearly in more than just the words we use. We symbolize, gesture and indicate all to better illustrate the abstract world. Our use of multimodality, such as gesturing whilst speaking, consciously or subconsciously, is a means of communicating and adding layers of iconicity to our language, ultimately facilitating understanding with our fellow interlocutors. The following sections will tie together the knowledge from the preceding chapters to discuss a subtype of ideophone, onomatopoeia, as well as a closely related group of words—phonaesthemes.

1.1.5.3 Onomatopoeia as ideophones

Onomatopoeia, or words that stem imitate sounds in the real world (Hauser et al., 2002), can be found consistently across all spoken languages (Perniss et al., 2010) and are perhaps the single most salient form of iconicity in English, considered a type of ideophone (Dingemanse, 2012). There are a variety of definitions for onomatopoeia across the literature, but the most inclusive seems to be from Assaneo et al. (2011) in which onomatopoeia is defined as any word which aims at ‘imitating sounds produced by people, animals, nature, machines and tools’.

Onomatopoeic words are ubiquitous across all languages, but perhaps more so in languages without a sophisticated writing system (Hutchins, 1999). Not only did Callebaut (1985) find that 4% of bird names in 1916 French were onomatopoeic, but these findings were similarly low in other Indo-European languages around that time (7% for Dutch, and 13% for Flemish).

Comparing this to non-Indo-European languages, approximately 39% of bird names appear onomatopoeic in Kaluli (Feld, 1982) and as high as 49% in languages such as TzetItal Maya (Hunn, 1977). Yet despite their quantity and profound iconic underpinnings, it has been mentioned that onomatopoeia as a phenomenon has received ‘insufficient attention’ (Hauser et al., 2002); this may be at least in part due to onomatopoeic words making up only a small portion of spoken languages’ total lexica (Perniss et al., 2010).

Across the world, children as young as 2-years-old begin utilising onomatopoeia in their daily vocabulary (Laing, 2019), with up to 40.6% of their first five words being onomatopoeic (Tardif et al., 2008). At least in languages such as English, onomatopoeia has become the archetypal example of iconicity (Thompson, 2018). As a result, they are often considered a sub-type of ideophone, however this is debated (e.g., see Schmidtke et al., 2014), particularly in ideophone-impooverished languages. Onomatopoeia describes acoustic perception whereas ideophones ‘depict sensory imagery’ (Dingemanse, 2012) and thus, for the purposes of this thesis, onomatopoeia will be considered separately from ideophones and analyzed in their own light.

Onomatopoeia can appear in the form of nouns (*cuckoo bird*), verbs (*splashing*, *barking*), adjectives (*squeaky*) and so on. However, Wundt (1904) also adds that many interjections can also be thought of as onomatopoeia, particularly when their function is the expression of sentiment or emotion (e.g., Uff! Ah!).

1.1.6 The Iconicity of Phonaesthemes

Phonaesthemes are frequently recurring sound-meaning pairings that are not overtly contrastive morphemes (Bergen, 2004), such as the English *gl-* phonaestheme found in many words associated with light or vision. Magnus (2000) identifies a range of phonaesthemes in English, for instance, *glimmer*, *glow*, and *gleam*, all of which begin with the [gl] cluster. Phonaesthetic similarities typically manifest themselves as morphological recurrences or at the beginning of different words (e.g., *snout*, *sniff*, *snort* etc.) and fall within the same semantic field (Bromberg, 2007). Phonaesthemes are units often smaller than morphemes, but still meaningful (Hutchins, 1998), for instance the words *twist*, *tweak*, *twizzle*, *twirl*, and *twine* can be seen to share the semantic quality of spinning in some way (Lockwood & Dingemanse, 2015). When studied individually, phonaesthemes can appear non-iconic, though at least some have also been debated to be iconic (see Sadowski, 2001). When studied as a group, phonaesthemes are always ‘systematic’, i.e., the range of words within said group manifest a systematic relationship between form and meaning (Bromberg, 2007), and some are also iconic.

Phonaesthemes do not have to be language-specific. Schmidtke and colleagues (2014) mention how similar consonant sequences can even be found across related languages, with /s/t/r/ reflecting concepts of straightness in both English and Gaelic (Magnus, 2000 as cited in Schmidtke et al., 2014); Winter et al., (2017b) mention how a range of studies across cultures have found a cross-linguistic tendency for words denoting *nose* to contain nasal phonemes such as /n/ e.g., *nose* in English, *anf* in Arabic, *nariz* in Brazilian Portuguese, *nez* in French and so on (see Greenberg, 1978; Urban, 2011; Blasi et al, 2016).

The sound-meaning patterns of phonemes are generally accepted to be (at least) partially predictable rather than totally arbitrary (Hutchins, 1998). In her study, English speakers matched words containing English or Austronesian phonaesthemes with their semantic glosses. Results for English items were twice that which was expected by chance and findings were also above chance for Austronesian items, though the comprehensibility of Austronesian phonaesthemes was found to be due to their onomatopoeic nature. This brings into question the precise variable for cross-linguistic comprehensibility: the study suggests the comprehensibility of the phonaestheme subset was amplified due to the effect of onomatopoeia working within the phonaesthemes. Therefore the question arises, can the two variables truly be disentangled, or is

onomatopoeia part-and-parcel of phonaestheme units? Phonaesthemes have indeed been found to be highly sensory words in general, and at least in English, sound words (e.g., *hissing*, as opposed to touch words or sight words e.g., *mushy* or *murky* respectively) appear to contain many more phonaesthemes than words for other modalities (Winter et al., 2017a). This appears to be due to their inherent roots in direct sound-to-sound associations (Rhodes, 1994), and thus the findings by Winter et al. (2017b) could be argued to naturally lead to onomatopoeic tendencies and other general sound associations.

The reality of phonaesthemes as meaning-carrying units causes issue for the traditional definition of morphemes being the minimal unit of meaning (as propounded by Nida, 1949), and it has been traditionally accepted that morphemes are the smallest possible unit of meaning (Katamba, 2015; Yule, 2010). To find common ground, some have considered creating a new class of units of meaning that is comprised of different phonaesthemes, however the meaning of phonaesthemes are probabilistic in that not all of the sound patterns of phonaesthemes can be clearly defined the same way morphemes can. The *un* in *unable*, *unmanned* and *unknown* may have a defined morphemic definition, but this does not explain the *sn* in *snout*, *sniff* and *snort* or other phonaestheme units. Not being able to define each phonaestheme is one reason that they have typically been excluded from the category of morphemes (Hutchins, 1998). This being said, such an issue does not discount their existence as meaning-carrying units at least *some* of the time, and thus, at least insofar as iconicity is concerned, their mere existence as potential meaning-carrying units is enough to warrant their inclusion in any substantive study of sound-symbolism.

When considering form and meaning more generally, it has been posited that in languages, such as Arabic, there is an inherently systematic relationship between form and meaning (extrapolated from a study of a subset of one thousand highly frequent words; Bromberg, 2007)—even when these words do not share similar phonaesthetic form(s). ‘As phonetic similarities increase, so do semantic similarities’ (ibid:12). If this is the case, what of words that also share phonaesthemes clusters? In English at least, there is a noticeable correlation between ‘form distance’ and ‘meaning distance’ between words that share the same onsets, otherwise known as phonaesthemes. With the possibility of an inherent systematicity in Arabic, perhaps similar phonaesthetic findings could be elicited when compared across words that contain pre-existing morphological or phonetic regularities as indicated by Bromberg.

1.1.7 The Iconicity of Word Classes

Lastly, the final area in which we will discuss the presence of iconicity is in traditional, day-to-day word classes. Studies have looked into word classes such as nouns, verbs, interjections etc. (Berlin & O'Neill, 1981; Perry et al., 2015; Winter et al., 2017b) in an attempt to examine whether entire categories of words tend to be more iconic than others and if so, why.

Firstly it must be noted that even in English, there are words that do not always fit neatly into a particular word class, for instance, the word *by* in *by and large* does not appear to be a preposition nor neatly fit into any typical category or syntactic pattern (Hilpert, 2014:11; also see Goldberg, 2006). Similarly, in other languages, the categories of noun, verbs, adjectives are not always clear-cut, and thus do not necessarily match the grammatical definitions or syntactic parameters used to categorize nouns, verbs and adjectives.

Additionally, other languages may look towards other functions of speech as salient forms of communication instead of grammatical class, for example tone, pitch, and intonation (Couper-Khulen, 2011). In Mandarin, there is the capacity for high tone to act as a systematic marking or delineator of iconicity as a word class (Schmidtke et al., 2014; Thompson, 2018), however this is not the case across all words, so it appears that tone alone cannot currently be collapsed into a category of iconic depiction (Schmidtke et al., 2014).

Winter et al. (2017a) conducted an expansive study of 3001 English words, collecting iconicity ratings for each word and aggregating these results by POS (Part of Speech) and sensory domain (sight, sound etc.). Their results replicated previous findings showing onomatopoeia and interjections highest in iconicity, followed by verbs, adjectives, nouns and then grammatical closed class words or function words.

Perry et al. (2015) conducted experiments that looked at the iconicity ratings of POS categories in both English and Spanish. In Experiment 1, participants rated words on an iconicity Likert-scale, from iconic (5) to non-iconic (-5). The average rating across all words indicated that, 'on average, the words were viewed to be mildly resembling their meanings, that is, iconic'. *Figure 5* presents the results for all POS groups rated.

Word	Lexical category	Average Rating
Moo	Onomatopoeia	3.88
Ouch	Interjection	3.46
Sticky	Adjective	2.93
Stop	Verb	2.50
Jeans	Noun	0.00
Here	Function Word	-0.20

Figure 5 - Most iconic POS categories in written English from Perry et al. (2015)

Perry and colleagues found that in both languages, onomatopoeic words and interjections were the most iconic, followed by adjectives, which frequently denote sensory properties. Adjectives were found to be more iconic than nouns and closed-class words. Moreover, in English—a language in which verbs typically express manner of motion (Talmy, 1991)—verbs were also found to be more iconic than nouns and closed-class words. However, this was not the case in Spanish, where verbs typically do not express manner information.

They found that iconicity in the words of both languages varied in ‘a theoretically meaningful’ way with lexical category; for instance, in both languages, adjectives were rated as more iconic than nouns and function words, and English verbs were rated as relatively iconic compared to Spanish verbs.

After onomatopoeia/interjection, adjectives appear to be highly iconic as a word class in English and Spanish. Verb ratings however are language-dependent in that their iconicity ratings are not consistent across the board. Perry et al. (2015) showed that typological differences between English and Spanish in verb semantics meant that English verbs were rated as relatively iconic compared to Spanish verbs in their study. This appears to be because Spanish as a language encodes the meaning of its verbs within the word whereas English does not. For instance, the sentence *the bottle floated into the cave* contains the verb *floated* which communicates manner of motion within it. In Spanish, a verb-framed language, such a sentence would have to be expressed separately from the verb:

*La botella **entró** a la cueva **flotando***

*The bottle **entered** [into] the cave **floating***

When considering languages such as Arabic, it may be the case that they are more or less verb-framed. Arabic for instance can both communicate manner of motion within the verb itself but also externally with an additional word, prepositional or adverbial phrase, thus perhaps iconicity ratings for Arabic verbs can be expected to reflect the kinds of results found in English.

1.2 Why iconic? Some of the functions of iconicity

So far we have discussed what makes a word iconic. What we have not touched upon so much are the benefits of iconicity. Why does it matter if a language contains iconic words? And, directly related—is there any hard proof for this phenomenon?

This chapter will delve into some of the purposes and benefits of iconicity for language users, why iconicity is studied and what many linguists posit to be the most fundamental question surrounding iconicity research: can iconicity provide clues to the origin of language itself? We will discuss the capacity for iconicity to stimulate language learning and vivid sensory imagery. The chapter will conclude with evidence of iconicity in the body and brain.

1.2.1 Language evolution

Admittedly, the history of language is vast. The reason why it is important to at least touch on however is that iconicity is tied in with many ancient and contemporary theories of language origin (Thomas, 2011). Cross-linguistic experiments provide support for iconic origin theories, with many developmental studies indicating towards an innate origin of iconic mappings (see Imai & Kita, 2014; Imai et al., 2008; Laing, 2019; Perniss & Vigliocco, 2014). An example that still persists to this day are the indo-European cognates or diachronically related forms of the word *cuckoo* (i.e., Ancient Greek, Latin, Sanskrit and English; Perniss et al., 2010). The absence of otherwise expected linguistic change is surprising: typically such a word is expected to shift into something like /huhu/ over time (known as Grimm's Law⁵). Iconic theories suggest that the word remains relatively unchanged due to the link between the /k/ sound and the actual sound a cuckoo bird makes; thus, this seems to provide evidence that languages 'conspire to preserve' iconic form-meaning mappings over time (Perniss et al., 2010). And if we look back through time, we may find that these remnants of iconicity provide clues to the first speech. The current subchapter will discuss two somewhat related, iconic theories of language origin: the bow-wow theory and the vocal theory.

⁵ Grimm's Law states there is an expected shift of voiceless plosives to voiceless fricatives across words over sustained periods of time (Perniss et al., 2010).

The bow-wow theory of language origin posits that the first human transition from hand gestures to vocal communication came through the evolution of sound-symbolic words (Robson, 2011; Thomas, 2011). *Cuckoo* may have been deemed an apt name for the bird because it mimics the sound of said bird. This would have then advanced to cross-modal connections also; *kiki* for instance may have been the most ‘fitting’ word (Cuskley & Kirby, 2013) for a jagged rock due to its iconic properties in the first ‘proto-language’ (Ramachandran & Hubbard, 2001:19). As time went on, the vocabulary of early humans grew to a level where the sounds of words could no longer evoke the direct meaning of referents (Cuskley & Kirby, 2011). This would have pushed humans to develop increasingly arbitrary terms, developing into the complex language systems used today (Robson, 2011).⁶ Some studies into iconicity have aimed to uncover these first proto-words (Ramachandran & Hubbard, 2001) and ultimately trace the evolution of human communication from its arguably iconic roots through to its more sophisticated state today.

Similar to the bow-wow theory—albeit more restricted and specific—the *vocal theory* claims that language grew from ‘instinctive calls signifying distress, elation, and courting’ (Mayeux & Kandel, 1985:691). Studies into iconicity (e.g., see Perry et al., 2015; Winter, 2017a) have found a correlation between interjections, which harken emotion and emotional states (Wundt, 1904), and perceived levels of iconicity; thus the modern findings of sound-symbolic experience as discussed in previous chapters, in some way may be a relic of these ancient origins when inner states were directly expressed with single sounds (Auracher et al., 2010) and/or words.

⁶ Such claims are not without opposition of course. For instance, the bow-wow theory was entirely rejected by the great philologist Max Müller who in fact coined the term through his criticism (Thomas, 2011). He proposed instead that language evolved from a collection of roots inherent in human nature and that these have been variously eliminated, expanded and combined over time.

1.2.2 Language learning

It has been suggested that iconicity may act as an aid to language learning (Monaghan et al., 2012), as words high in iconicity might make it easier for naive listeners to guess the meaning of the word (Motamedi, 2019). A child may have received input from iconic words to such an extent that they are ‘primed’ (Bromberg, 2007:15) such as by onset systematicity (multiple words starting with the same clusters) and so as they move on through their language-learning journey, they may appeal to previously experienced form-meaning correspondences when learning names for new objects or new concepts (Bromberg, 2007; Imai & Kita, 2014)—such as learning the meaning of *glimmer*, and thus more readily being able to learn the related meanings *glitz*, *glow* and *glitter*. This would allow a greater facilitation of the language learning process (Gleason, 2005; Huang, 1969; Imai & Kita, 2014; Walker, 2016) from a very young age. Imai and Kita (2014) are perhaps the greatest proponents of this view, claiming that from as young as infancy, pre-verbal children are sensitive to iconicity due to a ‘biologically endowed ability to map and integrate multi-modal input’ (ibid:4) and that this ingrained ability helps facilitate word-meaning associations.

The evidence of sound-symbolism onset at early stages of language development suggest a universal basis of motivated signs to be considered (see Imai & Kita, 2014; Laing, 2019). We find evidence of such claims in both adults (e.g Auracher et al., 2019; Lockwood et al., 2016; Parault, 2006) and children from a very young age (e.g., Imai et al., 2008; Kantartzis et al., 2011). For instance, across languages, infants’ early vocabulary consists of a ‘surprisingly high proportion’ of onomatopoeia (Laing, 2019). Tardif et al. (2008) found that in a study of 8-16 month olds, nearly 30% of infants’ first ten words in American English were onomatopoeic, whilst this proportion was as high as 40.6% in languages such as Cantonese. It appears that word acquisition in early childhood often contains onomatopoeic words because their inherently iconic properties enhance understanding (Gleason, 2005; Perniss & Vigliocco, 2014; Schmidtke et al., 2014). Not only this, but when running a study *excluding* onomatopoeia, Perry et al., (2015) found that early-acquired words were still rated as highly iconic, though non-onomatopoeic.

There seem to be a number of potential factors for this, and, though not inherently iconic reasons, they may be argued to increase the memorability of words: principally, the open CV syllable (e.g., *baa* / *moo*) and reduplication (*woof woof*) found common amongst onomatopoeia

and other iconic words might make them ‘particularly suitable for early acquisition’ (Laing, 2019) as they are phonologically simple. Highly iconic words may thus facilitate or stimulate the initial word-learning process for young children because such words will also be comparatively easy to articulate and easy to remember.

As children grow however, words which are more arbitrary become more frequent in their vocabulary (Perry et al., 2015; Perry et al., 2018). It has been posited that for increasingly complex referents, increasingly arbitrary words must be assigned due to the limited scope of iconic words to carry enough meaning for all concepts in the world (Laing, 2019). Thus words high in iconicity, limited as they are in potential meaning-carrying ability, naturally begin to give way to less iconic words as children develop.

Other studies illustrate the importance of iconicity in scaffolding adult language learning such as in second language learning or in foreign contexts: Lockwood et al. (2016) found in a study of Dutch speakers learning Japanese ideophones, that Dutch speakers accurately and consistently guessed meanings of Japanese ideophones. This accuracy was higher when in the true meaning condition compared to conditions where opposite meanings were supplied, and this sensitivity occurred even when meanings and stimuli were mixed. The findings ‘convincingly’ (Laing, 2019) showed that the Dutch adults were able to learn foreign words best when they were mapped iconically onto their referent.

Iconicity also serves to stimulate vivid sensory imagery, and many would argue this is in fact the main purpose of sound-symbolism (Lockwood & Dingemans, 2015; Thompson, 2013; Wiseman & van Peer, 2003). When iconic words, through their combination of prosodic features, general acoustic qualities and even orthographic characteristics help to express meaning, they are increasing the perceptual content being transmitted to the hearer or reader (Winter, 2019a). If the primary function of language is to communicate a message in as succinct a way as possible (Yule, 2019), then iconicity serves to amplify this expressive capacity and helps listeners visualize and better understand what the speaker intends.

To conclude this subchapter, there are a number of benefits of iconicity being pervasive in a language. Of them, two primary benefits that have been the focus here are the facilitation of word learning (and by extension, language acquisition) and more broadly—general cognitive ease.

1.2.3 An extension of gesture

Iconic theories of the origin of language can also shed light on why, across languages, many of the words depicting smallness are articulated with a narrowing of the vocal tract (Auracher et al., 2010; Imai & Kita, 2014). Synkinaesia (Ramachandran & Hubbard, 2001), or the activation of two motor mappings, may explain this phenomenon: specifically, Imai & Kita (2014) suggest that due to the ‘tight link’ between iconic words and co-speech iconic gestures, they must have evolved simultaneously, and therefore Ramachandran and Hubbard (2001:21) posit that a ‘primitive vocabulary of gesture and pantomime could evolve through synkinaesia into a corresponding vocabulary of tongue/palate/lip movements’. This relates closely to the many instances of multimodality we find when speaking and may reveal why from a young age humans naturally adopt hand gestures and general body language whilst speaking.

Also related, as mentioned in previous chapters, is the phenomenon of different phonemes expressing (un)pleasantness in words, such as nasal phonemes expressing unpleasant or sad moods, and plosive phonemes, pleasant, happy moods (see Auracher et al., 2010). One hypothesis stemming from ancient language theory is that the articulation of particular phonemes were once used to mirror other bodily postures, which were in turn related to emotional states (Auracher et al., 2010). An example given by Auracher and colleagues is the closed mouth with constrained lips found in some nasal phonemes, said to simulate the body movements of people who are in depressed or passive moods. Conversely, the opening of the mouth and rush of air found in plosive phonemes is said to be associated with active or happy moods.

This short section has touched upon some of the many theories pertaining to our first language(s) and the potentially iconic origins. We will now move on to a more contemporary field of study, evidence of iconicity in the brain and in the body.

1.2.4 Sound-symbolism in the brain: the hard science of iconicity.

This last section of 1.2 is not so much about the purpose or benefit of iconicity. Instead, this section will discuss evidence of iconicity from a scientific perspective. Some of the most clear empirical evidence for iconic theories of language processing come from brain imaging studies. Lockwood & Dingemans (2015) mention that ‘it appears that sound-symbolic words activate sensory areas more strongly than arbitrary words.’ Returning back to the phenomenon of synkinesia, Ramachandran & Hubbard (2001) in their paper relating to verbal production and hand movement mention how two areas of the Penfield motor homunculus may be synkinetically mapped when speaking and gesturing. The ‘pincer-like opposition of thumb and forefinger to denote small size’ (Ramachandran & Hubbard, 2001:21) may be emulated by the jaw when producing words with front-vowels that typically denote smallness such as in the word *teeny*.

In a series of fMRI experiments (functional magnetic resonance imaging, detecting changes in brain activity through measurements of blood flow), Revill et al. (2014) and Kanero et al. (2014) both found that iconic words activate the ‘sensory’ areas in the brain (Winter, 2017a) more so than non-iconic words. A highly cited study exemplifying this phenomenon is Hashimoto et al., (2006) who found a different region of the brain activated when processing either arbitrary nouns or genuine animal sounds⁷. Onomatopoeia on the other hand, activated both regions simultaneously, thus serving ‘as a bridge between processing’ of both (Hashimoto, 2006:1768). Arata et al., (2010) found that the areas of the brain typically associated with cognitive processes were activated by ideophones but not by arbitrary verbs or adverbs. This is often used as evidence indicating that iconic words are neurally processed in a manner different to non-iconic words (e.g., see Arata et al., 2010; Assaneo et al., 2011; Laing 2019).

Chapter 1.2 has aimed to summarize theories of language pertaining to iconicity, how iconicity can help in language learning, and how evidential underpinnings for iconicity can be found through fMRI and imaging studies. This has brought us to the end of studying sound-symbolism as a linguistic phenomenon in and of itself. However, iconicity is a phenomenon that manifests itself in text, and against the backdrop of language. The current

⁷ Namely, the left anterior superior temporal gyrus for nouns, and bilateral superior temporal sulcus as well as left inferior frontal gyrus for animal sounds.

paper is motivated by the Qur'an primarily and the relationship the Qur'an has with iconicity; for this reason, Chapter 1.3 looks to link together everything mentioned thus far and consider the possibility of iconicity in the Qur'anic Script.

1.3 Iconicity and the Qur'an

This chapter will discuss the Qur'an and why I believe there is (to some extent, unstudied) iconicity within the Qur'an. However, this is a considerably large topic. And before we can jump into the Qur'an, we must first begin the final part of Chapter 1 with a discussion of the utmost importance: art.

It is believed that art shows a particularly strong resonance of both form and content (Arnheim, 1986; Eldridge, 1985; Hegel, 1998), furthermore, it has been posited that iconic sound-meaning relationships are likely to be found frequently in one of the heights of art—poetry (Jakobson, 1960). Whilst iconicity can be found in many places such as paintings, logos, flags—even natural and daily language—it is in art that we find iconicity in abundance. And it is in poetry, Auracher et al. (2019) argue, that such instances of linguistic iconicity are found at the highest degree.

For Muslims (e.g., Akhtar, 2007), philologists of Arabic (e.g., Dawood, 1990; Gibb, 1970), and linguists (e.g., Bohas et al., 2016; Owens, 1989; Versteegh, 1993) alike, the Qur'an is unique in its stylistic marvel, its eloquence and its brevity (Armstrong, 1999; Lings & Barrett, 1983; Versteegh, 2014). In spite of this, it is not a book of poetry. Within the Arab world, the Qur'an is near unanimously considered the height of literary achievement (Akhtar, 2007; Tzortzis, 2007; Fakhry, 2004). Yet Qur'an is a distinct form of Arabic literature, and in fact of Arabic—neither prose nor poetry, but rather a distinct fusion of metrical and non-metrical composition (Arberry, 1998; Lawrence, 2005; Nicholson, 1930:159; Tzortzis, 2007)⁸.

Though the Qur'an is not considered poetry in and of itself, it contains many poetic techniques, including varied use of metre, figurative language and rhetorical devices, having been revealed, Muslims believe, at a time when Arabic literature was at its peak (Shahiditabar, 2017). The main concentration of Chapter 1.3 will therefore be the poetics as found in the

⁸ 'But you know that the Qur'an is not prose and that it is not verse either. It is rather Qur'an, and it cannot be called by any other name but this. It is not verse, and that is clear; for it does not bind itself to the bonds of verse. And it is not prose, for it is bound by bonds peculiar to itself, not found elsewhere; some of the binds are related to the endings of its verses and some to that musical sound which is all its own. It is therefore neither verse nor prose, but it is "a Book whose verses have been perfected, expounded, from One Who is Wise, All-Aware." We cannot therefore say it is prose, and its text itself is not verse. It has been one of a kind, and nothing like it has ever preceded or followed it.' (Husayn, 1930 as cited in Tzortzis, 2019)

Qur'an. If it is indeed considered the epitome of Arabic literature and 'art', the Qur'an should (theoretically at least) also exhibit instances of iconicity as can be found in typologically conventional poetry.

The following subsections aim to prepare the reader for the main event on iconicity. Firstly we will discuss the spread and development of Arabic and compare this to other Semitic languages and the coming subchapters will provide an abridged background to the phonology, morphology, alphabet and sound inventory employed by the Qur'anic Script. There will be a presentation of previous findings pertaining to poetics in the Qur'an, followed by a discussion of the extent to which previous findings may align with linguistic understandings of iconicity, and if they can provide any evidence of iconicity in the Qur'an as we see it today.

1.3.1 The development of Arabic

The original homeland of Arabic includes the central and northern regions of the Arabian Peninsula. The end of the sixth century saw the rise of Islam which spread rapidly throughout the Peninsula, and within 100 years had extended north into the Levant, east into Iraq and Khuzistan, and west into North Africa. Over the centuries, the religious frontiers of Islam quickly stretched into Spain, Africa, India, Indonesia, and across central Asia into Turkestan and China (Gibb 1978: 10). This was not only a religious and cultural conquest, but also a linguistic conquest (Watson, 2002:6) through the process now referred to as *arabicization*.

Due to the 'prevailing tolerance on the part of the Muslims to Christians and Jews' (Watson, 2002:6), arabicization was a more 'complete process' (Watson, 2002:6) and progressed at a greater rate than Islamization (Versteegh 1997:93), such that within a few hundred years Arabic became both the official and the vernacular language of many countries in the Middle East.

The Arabic of today is derived principally from the old dialects of Central and North Arabia; of these, the language of the Hijaz was considered to be the purest, while that of the neighbouring tribes was felt to have been 'considerably contaminated' by other Semitic and non-Semitic languages (Watson, 2002:7). The original Arabic of the Qur'an is considered unchanged throughout history (Lahmami, 2016:2), and it is this Hijazi Arabic that Classical Arabic was founded upon with some interference from pre-Islamic poetic koine and eastern dialects, albeit, again, 'codified' (Watson, 2002:8) in the Qur'an.

The canon as it is now realised, both in terms of chronology well as finalization of accepted wording, was fixed during the reign of the third caliph, Uthman (644-656), approximately two decades after the death of Prophet Muhammed—though a few refinements of 'purely grammatical and orthographic nature' were made in the tenth century (Fakhry, 2004:xviii). Since then it has been used as the standard for prescribing linguistic rules and ascertaining conventions of sixth/seventh century Classical Arabic.

In the modern age, most Arabs speak a dialectal vernacular and reserve what is known as Modern Standard Arabic for otherwise formal occasions⁹. Whilst the lexis, grammar and

⁹ This is detailed in Watson (2002:8): *'No one in the Arab world is brought up speaking Standard Arabic as their mother tongue: an Arab child's mother tongue will be the regional or social variety of Arabic of its home region, while Standard Arabic, if it is mastered at all, is learnt formally at school or at home as part of the child's education. Standard Arabic is confined to formal written and spoken occasions, and the regional/social variety of*

stylistics of Modern Standard Arabic are rather different from those of Classical Arabic, the morphology and syntax have remained principally unchanged over the centuries (Hetzron, 1997:188). This being said, in all modern Arabic dialects, there has been a change in the number and pronunciation of the consonantal phonemes; dialects which have exhibited most innovation in terms of pronunciation are the urban dialects spoken outside the Arabian Peninsula, whilst nomadic dialects and dialects of the Peninsula have retained the most features of the Classical Arabic phoneme inventory (Watson, 2002).

Today, Arabic is the sole or joint official language in over twenty countries, stretching from Western Asia to as far as North Africa, with Arabic now being the native language of 200-300 million people (Holes, 2004; Simons & Fennig, 2017) all across the globe. Arabic loanwords and Arabic influence more generally can be found across cultures and in languages such as English (e.g., *admiral*, *sugar*, *magazine*), Italian, Portuguese, Urdu, German and Serbian amongst others (Al-Sharkawi, 2016; Versteegh, 2014). These loanwords and cultural influences will be particularly relevant in the coming experiments for they may provide a conscious or subconscious cultural influence on a speaker's perception of iconicity in Arabic.

To better understand the complex language and style the Qur'an employs, first, we must deconstruct Arabic itself. The next few subchapters will discuss some of the building blocks of Arabic, with both its phonemic inventory and associated alphabet. There will be sustained reference to Janet Watson's comprehensive grammar, *The Phonology and Morphology of Arabic* (2002). Syntax will not be discussed in this paper as it is firstly an extensive topic and out of the scope of this thesis, and secondly not applicable to the coming experiments (however for an excellent review of Arabic syntax, see Holes, 2004).

Arabic is used at all other times. Standard Arabic now differs considerably from regional and social colloquial varieties of Arabic in terms of its phonology, morphology, syntax, and lexicon.'

1.3.1.1 The phoneme inventory of Arabic

Arabic is a language in which the twenty-eight consonants that comprise its alphabet have a one-to-one correspondence with the letters that represent them (Bromberg, 2007). Though modern dialectics vary, in the eighth century, Classical Arabic had twenty-eight consonantal phonemes¹⁰ in nine places of articulation (Watson, 2002). There are also three basic vowels in Arabic, /a/, /i/, /u/, that appear in both short and long form (Watson, 2002) and combine with, or inflect the consonants. Just like other Semitic languages, Arabic contains a rich inventory of guttural consonants, including laryngeals, pharyngeals and uvulars which are not attested to in languages such as English. *Table 1* (adapted from Watson, 2002:13) shows the range of consonantal phonemes found in Arabic by the eighth century.

Table 1 - Consonantal phoneme inventory in Classical Arabic

	Labial	Labio-dental	Inter-dental	Dental-alveolar	Palatal	Velar	Uvular	Epiglottal	Glottal
Plosive emphatic	b			t, d, ð	ʃ	k	q		ʔ
Fricative emphatic		f	ṭ, ḍ, ẓ ¹¹	s, z, ṣ	ç		χ, ʁ	ħ, ʕ	h
Nasal	b			n					
Lateral emphatic				l, ḍ					
Tap				r					
Glide					j	w			

¹⁰ The Arabic alphabet begins *alif*, *baa*, *taa*. Some Classical grammarians argued that the letter *alif*, traditionally regarded as the first letter in the alphabet, should be included to give twenty-nine phonemes (e.g., see Sibawayh, 1982:431; Al-Nassir, 1993:11). Others however disagreed: the majority view is that *alif* is a rather an orthographical exception that in fact indicates a form of three vowels in Arabic (Versteegh, 2014), and thus does not hold any different sound; yet others have said *alif* is just another representation of *hamza*, or the glottal stop in Arabic, and thus should not be included as a separate phoneme (Holes, 2004). Due to the opposing views, this paper will continue to use the more widely accepted view of twenty-eight phonemes, omitting *alif*.

¹¹ ð^s in IPA

1.3.1.2 Morphology of Arabic

Arabic, similar to other Semitic languages, uses a root and pattern morphology of two, three or four consonants, also known as radicals (Agmon, 2010; Holes, 2004; Watson, 2002). With the exception of Bohas (1997), who argues that each of the trilateral radicals of Arabic words in fact stem from a biconsonantal root (see footnote 2), the consensus is that nearly all Arabic words originate from a triconsonantal base (McCarthy and Prince 1994), with the exception of function words and some non-derived nouns. The base of three consonants allows for the templatic or pattern derivation of a plethora of words (Holes, 1995:81), and nearly all words in Arabic can typically be traced back to three initial radicals. *Figure 6* depicts an example of this trilateral derivation that constitutes much of the Arabic lexicon.

POS/Thematic Role	Derivative	English Approximation
Third person masculine singular verb	<i>sajada</i>	He worshipped
Agent or Active Participle (male)	<i>saajid</i>	Worshipper
Location	<i>masjid</i>	Place of worship

Figure 6 - Derivations of the trilateral radicals /s/j/d/

From this one can glean that the three root-letters /s/j/d/ provide the meaning of prostration or worship in some way. Dictionaries of Arabic (e.g., Lane, 1872; Wehr, 1979) record the meanings of the different radicals such that once an individual has learnt the general templatic morphology of Arabic, they can thus easily derive a related word, so long as they are cognizant of three radicals. For example, once it is learnt that the root /k/t/b/ relates to *writing*, then it will be understood that *kataba* means *he wrote*, *kaatib* is a writer, *maktab* is an office and *kateeba* is a document (cf. Figure 6) purely from having learnt Arabic's templatic morphology.

The examples above illustrate how stems are formed in Arabic; morphemes can be added as prefixes or suffixes to a basic stem (Watson, 2002:124) e.g., *kaatib* is a writer whilst

kaatib^{aan} means two writers (dual), showing that nouns in Arabic can appear in dual form along with singular and plural forms.

The stem of a content word in Arabic has three discontinuous morphemes: the triliteral consonantal root (e.g., /s/j/d/); the templatic pattern into which the consonantal root is inserted (e.g., *saajid*, *worshipper*; *kaatib*, *writer*); and the intercalated vowels (i.e., the vocalic melody: /a/u/i/) which mark variations in, for instance, the active or passive in verbs, and singular-plural relations in nouns and general agentive relations (Watson, 2002:126). The Arabic verb system is also rich in derivational patterns, such as the stem pattern CVCCVC with a geminate middle radical (Watson, 2002:125; also see earlier) showing intensification over the typical CVCVC verb-form. Due to the scope of the current essay however, deeper analysis of Arabic morphology will be left to other more comprehensive works (e.g., see Wright & Caspari, 2011).

1.3.2 The Qur'an

It is important to note that Chapter 1.3 is not intended to be a religious one. And whilst this section will expound upon what Muslims believe regarding the specific language used in the holy book, this chapter is equally not intending to proselytize. The Qur'an will be analyzed through experimental work and analyses in later chapters. This having been mentioned, the current few subchapter will make reference to Muslim belief: theology is interwoven into the Qur'an, and must be understood to genuinely appreciate its message, its history and its significance as a case worth studying.

Arabic, and thus Qur'anic Arabic, is a member of the Semitic language family. This is itself part of the wider Afroasiatic phylum including Ancient Egyptian, Coptic, and Cushitic; other principal members of the Semitic family are the East Semitic languages of Akkadian and Eblaite and the West Semitic languages of Aramaic, Ugaritic, Canaanite languages (including Hebrew), and the Semitic languages of Ethiopia (Watson, 2002:1).

The word Qur'an literally translates to *The Recitation* (Qadhi, 1999). Practising Muslims recite the Qur'an at least five times a day in their prayers, and believe that the Qur'an is the inimitable word of God (Harb, 2015; Larkin, 1988; Rippin & Knappert, 1990), sent down piecemeal over 23 years to the Prophet Muhammed by the archangel Gabriel in 7th century Arabia (Lings & Barrett, 1983). The magnetism of the Qur'an was perhaps most pronounced due to Prophet Muhammed's illiteracy (Sells, 2000): he would verbally recite the Qur'an as it was revealed to him without pause¹², complete with all tropes, schemes, metres, rhetoric and references to the scientific and historical (Arberry, 2007; Bucaille, 1978; Ruthven, 2006). Claims of scientific and historic miracles (e.g., see La'li, 2007; Tzortzis, 2012; Guessoum, 2010) notwithstanding, what is often considered one of the greatest successes of the Qur'an was its exponential growth and acceptance at a time when Classical Arabic was very much on the brink of its literary zenith (Ghotbi, 2020; Lawrence, 2014).

Although Arabic, as a language and a literary tradition, was quite well developed by the time of Muhammad's prophetic activity, it was only after the emergence of Islam, with its founding

¹² Whilst his people would write so as to preserve every word (Lings & Barrett, 1983).

scripture in Arabic, that the language reached its utmost capacity of expression, and the literature its highest point of complexity and sophistication. Indeed, it probably is no exaggeration to say that the Qur'an was one of the most conspicuous forces in the making of classical and post-classical Arabic literature.

(Kadi & Mir, 2001:213)

During the 7th century, poetry illustrated the essence of intellect, culture, and sophistication for the Arabs of that time. Arabian poetry was deeply studied by its people for it was simultaneously their media, their vehicle for politics, their sport or competition, and their literary success (Fakhry, 2004:39). The people appreciated the codified sixteen rhythmic styles, with varied metres and tropes (Tzortzis, 2007)—and thus the Arabs honoured themselves through their poetry, with it being their most highly studied cultural artefact and at the core of their society. In the words of Hamilton Gibb, they were ‘connoisseurs of language and rhetoric’ (Gibb, 1980:28). Yet, in such a context, the Qur'anic Script came with an unprecedented literary form.

And so it was this—its all-round inimitability (Larkin, 1988)—that lay at the heart of its claim to being of divine origin (Armstrong, 1993:171) and precipitated its rise to becoming the acme of Arabic literature (Lawrence, 2014). This is summarized by Chapter 2, Verse 23 of the Qur'an which presents an eternal linguistic challenge, encapsulating the divine claim to inimitability and poetic apogee:

وَإِنْ كُنْتُمْ فِي رَيْبٍ مِّمَّا نَزَّلْنَا عَلَىٰ عَبْدِنَا فَأْتُوا بِسُورَةٍ مِّمَّنْ مِثْلِهِ وَادْعُوا شُهَدَاءَكُمْ مِّنْ دُونِ اللَّهِ إِنْ كُنْتُمْ صَادِقِينَ

And if you are in doubt about what We have revealed to Our servant¹³, then produce a sûrah¹⁴ like it and call your helpers other than Allah, if what you say is true.

(translation by Khattab, 2015)

As time went on, The Qur'an began to be viewed by the Arabs, Muslims and non-Muslims alike, as a source of grammatical and lexicographical information (Pickthall, 1999; Sells, 2000) and eventually the standard for theories of Arabic literary criticism (Arberry, 1998). Reasons for this

¹³ i.e., Prophet Muhammed

¹⁴ i.e., a chapter. The shortest chapter in the Qur'an is three lines in length, or ten words.

included its abundance and intertwining of poetic and rhetorical features which will now be explored.

1.3.3 Poetics, rhetorical and iconicity in the Qur'an

This subchapter will briefly demonstrate why the Qur'an is studied as a literary phenomenon, and why I wish to enhance the studies into the Qur'an by looking into iconicity, an area which has not been looked at before in the way it is studied today.

The Qur'an is thought to contain a 'sea of rhetoric' (Tzortzis, 2007), exhibiting an 'unparalleled frequency' of poetic devices that surpasses all other Arabic texts, classical or modern (Esack, 1993). *Table 2* lists and references some of the highly concentrated figurative language devices and rhetorical features employed by the Qur'an as mentioned across the literature that could be defined as iconic according to different linguists. The term *language feature* is used as an umbrella term to include figurative language as well as poetic and rhetorical devices. All features mentioned refer to the Arabic text and pronunciation, as opposed to purely English translations¹⁵.

Table 2 - *Some of the language features in the Qur'an that could be analyzed for iconic properties.*

<u>Language Feature</u>	<u>Quranic Reference</u>
Alliteration	e.g., see Qur'an 33:71 & 77:20
Assonance	e.g., see Qur'an 88:25-26 & 88:14-15
Cadence	A major rhetorical feature present throughout the entire Qur'an contributing to its unique style. Quranic cadence features assimilation, nasalisation and assonance throughout.
Isocolon	e.g Qur'an 65:7-10
Metaphor	e.g Qur'an 19:4 & 21:18
Metonymy	e.g Qur'an 54:13 & 6:127

¹⁵ This being said, one may listen to a Qur'anic recitation accompanied with a translation of the verse in question to better understand these language techniques in their original form.

Onomatopoeia

e.g., Qur'an 2:19 & 25:12

The Qur'an also uses language and stylistic variation in ways that are contrasting to other forms of Arabic discourse, e.g., semantically orientated assonance and rhyme (Philips, 2003; also see Qur'an 4:114), grammatical shifts (Robinson, 2004; also see Qur'an 10:22), and a distinctive interrelation between sound, structure and meaning, (Qadhi, 1999; also see Qur'an 3:3-4).

The reason this particular subchapter is salient to the thesis at hand, is because to an extent all of the language features mentioned in the table above could have been used as a conduit for analysis. However, due to scope, we isolate one element of iconicity and pick this apart, and so whilst larger constructions such as metaphor and alliteration may not all fit into this one paper, we can attempt to do some kind of justice to iconicity in the words that comprise the Qur'an. Therefore the following subchapter will hone in on some of the sound-symbolic words in the Qur'an that will help streamline the criteria particularly to a study of iconicity.

1.3.4 Evidence of iconicity in the Qur'an

This final subchapter on the Qur'an will bring together our knowledge of sound-symbolism and the Qur'an to look at instances of Quranic iconicity. Whilst there have not been an extensive array of objective, scientific experiments into Quranic iconicity as have been conducted in other languages and great texts, there is a large body of subjective scholarly analyses of iconicity found within the Qur'an.

From a morphological perspective, studies have found that Quranic words derived from four-consonant roots primarily describe the characteristics of movement, sound and visual sensations (Rozov, 2020). As four-consonant roots are not the typical trilateral set that constitutes the vast majority of Arabic words, this additional meaning could be in direct relation to its additional phoneme and morphologically complex structure, used to enhance residual semantic impact.

Other instances of iconicity can be seen in the Qur'an's use of ideophones and phonaesthemes. Ideophones are rarely recognized in Arabic linguistics (Owens, 2003). On a 'crosslinguistic basis' though, a case could likely be made for including them, as some of the 'nominal verbs' of the classical grammarians for example, can be given an ideophonic interpretation (Owens, 2004). From a Qur'anic perspective, there are a number of prototypically ideophonic onomatopoeia e.g., sounds of whispers (/hamsaa/, Qur'an 20:108) and screeching or gasping (/fahijq/, Qur'an 11:106; also see Seyyedi & Akhlaghi, 2013). Bahaa-Eddin (2015) cites a number of ideophones in the Qur'an. Some are based on general phonosemantics, which convey 'vivid' meaning e.g., /raʕd/ with a pharyngeal fricative, meaning *thunder*. Others depict movement, e.g., /qarar/ containing the initial uvular stop /q/, a strong plosive phoneme, and repetition of the alveolar trill /r/, which 'reflects a sense of stability after oscillation'. Others are categorized due to morphological processes e.g., the phoneme differences between /tastatʕiʕa/, /tastatʕiʕ/, and /tastʕiʕ/. These three words all mean to have patience, but are used at stages in the Quranic story of Moses to show dwindling patience, reflected in the dwindling in the length and phonemes of each word (see Chapter 2 for further analysis and critiques of Bahaa-Eddin, 2015).

The classical scholar Shah Waliyyullah propounded that each *letter* in the Qur'an holds an underlying deep iconic meaning (Waliyyullah, 2014). In his book, *The Great Victory on*

Quranic Hermeneutics, he illustrates this concept with a detailed analysis of phonaesthemes clusters in Arabic. For instance, he posits that the onsets /n/ and /f/ in the words *nafakha* (to blow), *nafatha* (to blow with spittle), and *nafara* (to flee), all contain within them the underlying meaning of exiting or of going away. He thereafter postulates that such systematicity is not only limited to clusters of phonemes, but instead is indicative of an inherent iconicity in every letter or phoneme in the Qur'an¹⁶. His argument is that the Arabs of that time were familiar with their usages, and that is thus why they did not object to the Qur'an's use of mysterious letters (or the *huroof-al-muqatta'at*) at the start of some chapters.

These *huroof-al-muqatta'at*, or *unique letter combinations*, are standalone letters that make up the first verse of some of the chapters in the Qur'an (e.g., a chapter starting with the phoneme/letter *qaaf* or *noon*, similar to heading a chapter in English with a single Q or N followed by a fullstop). No scholar in Islamic history has ever claimed with certainty to know what they symbolize. Shah Waliyyullah however maintains that these letter combinations summarize the theme of the entire chapter that they introduce, and one must understand the sound-symbolic meaning of each letter to fully comprehend their standing at the beginning of a chapter. He establishes that there is iconicity at play in the combination, as exactly 14 of the 28 letters in Arabic are utilized in this mysterious form, and whenever they introduce a chapter in the first verse, they are immediately followed by some mention of the Qur'an. He gives the example of the first three verses of Chapter 50.

ق. وَالْقُرْآنَ الْمَجِيدِ

Qaaf. By the glorious Quran!

بَلْ عَجِبُوا أَنْ جَاءَهُمْ مُنْذِرٌ مِنْهُمْ فَقَالَ الْكَافِرُونَ هَذَا شَيْءٌ عَجِيبٌ

'All will be resurrected', yet the deniers are astonished that a warner has come to them from among themselves 'warning of resurrection'. So the disbelievers say, "This is an unbelievable thing!

¹⁶ Though of course some linguists would argue that translating phonemes into literary meaning is impossible, for they 'do not possess a fixed quality' (Miall, 2002); it is worth noting however that every linguistic tradition must be analyzed individually. What might hold true for one language may not be extendable to another without independent research into that particular linguistic tradition.

أَيْدَا مِثْنَا وَكُنَّا نُرَابًا ذَلِكَ رَجْعٌ بَعِيدٌ

When we are dead and reduced to dust? Such a return is impossible.”

He mentions that in Arabic, the use of /qaaf/, or the emphatic uvular plosive indicates sternness, roughness or great significance, similar to cross-cultural findings of /r/ indicating roughness (Winter, 2017b). By beginning the chapter with this standalone letter or phoneme, it symbolizes and summarizes the chapter’s themes: the clash of divine words with human denial and dialogic disbelief in the afterlife—profound, significant themes in Islamic theology. In relation to current linguistic theory, the phonemes present in these chapter starters often reflect the mood of the coming few verses and chapter as a whole, and so can be thought of as a symbolic marker with iconic underpinnings.

To summarize, the Qur’anic script does appear to contain instances of iconicity, this is found in the Qur’an’s use of poetic or rhetorical devices, ideophones, phonaesthemes, and other forms of iconicity which cannot all be exhaustively detailed in the scope of this paper. The degree to which iconic words are perceived by Arab and non-Arab speakers is the focus of this thesis, and, after a summary of the literature in Chapter 1.4, will create the foundational underpinnings for the current study—an objective, experimental approach to iconicity in the Qur’an.

1.4 Summary of Chapter One

Though only touching the tip of the iconic iceberg, Chapter 1 has been considerably dense. The current subchapter will summarise the most salient points to take forward, outlining what we know, what questions are raised and what we wish to find out. This will lead to the hypotheses of the current study and the experiments that follow.

We must firstly remember that iconicity and arbitrariness do not live in separate worlds. Rather, research shows that both are found within language (Perniss et al., 2010; Perniss and Vigliocco, 2014) and cannot be discounted as mutually exclusive. Whilst arbitrariness cannot be denied (Lockwood & Dingemanse, 2015), it is perhaps not as all-pervasive as traditional Saussurean thought might assert. Conversely, the literature shows us that there is certainly iconicity present across languages, but at times to a more modest degree than proposed by some staunch supporters of sound-symbolism (see Dingemanse et al., 2015, 2016).

Arbitrariness and iconicity exist in harmony because they ‘pick up each other’s slack’ (Lockwood & Dingemanse, 2015): it has been suggested that a language which consists of only iconic words could never meet all our communicative needs (Bühler, 1990). And, whilst a purely systemic language would lack expressive freedom, a perfectly iconic language on the other hand may limit the power of language to abstract (Dingemanse et al., 2015).

Iconicity does not always manifest itself in ‘strong’ form, nor always demand a one-to-one resemblance (Motamedi, 2019); a word can be iconic due to morphological qualities, phonemic properties, prosodic properties, amongst many others. From as far back as 1867, we find that iconicity encompasses a spectrum of different phenomena (Elgin, 1996), and whilst there are some more prototypical examples such as onomatopoeia, linguists do not always agree on what is iconic and what is not. One method around subjective categorizations however is to use the wisdom of the crowd and participant driven data (see Chapter 4 for a detailed discussion on ways of operationalizing iconicity).

With such an approach, studies have found that with results aggregated across participants, ideophone guessability is consistently higher than in non-ideophones, even from non-native speakers (e.g., see Iwasaki et al., 2007), English speakers can accurately decide on the concreteness of words from languages to which they have not been exposed (Reilly et al., 2017), and we find cross-cultural mappings of low vowels and back-vowels being associated with

concepts of largeness and high vowels and front-vowels associated with concepts of smallness (Lockwood & Dingemanse, 2015)

Iconicity exists in language(s) for a number of reasons: non-arbitrary form-to-meaning relationships facilitate building of a basic vocabulary in children, provide cognitive ease during and after the acquisition process, and may even harken back to our first proto-language (see earlier).

The Qur'an contains many apparent examples of iconicity (along with other language features), however, whilst examples have been enumerated in classical and modern works, these have primarily come from subjective analyses. There have not been statistical linguistic analyses into iconicity ratings nor meaning transparency of the Qur'anic words. The current study now aims to gather the linguistic, iconic apparatus available to us today, and—in light of modern research standards—administer objective, data-driven tests to participants from not only Arabic-speaking backgrounds, but also non-Arabic speakers using the words in the Qur'an.

To summarise some key terms, here is a summary of important definitions:

- Iconicity refers to the understanding that words can sound like what they mean.
- Sound-symbolism overlaps with iconicity, and whilst can be considered different in many ways, for the purposes of this thesis, the two are used interchangeably.
- Onomatopoeia refers to words that closely resemble what they mean in their sound. Examples include the *buzzing* of a bee and the *splashing* of water.
- Ideophones are marked words depictive of sensory imagery, noted for their special sound patterns, distinct grammatical properties, and sensory meanings.
- Phonaesthemes are frequently recurring sound-meaning pairings that are not overtly contrastive morphemes but are always 'systematic', i.e., the range of words within said group manifest a systematic relationship between form and meaning (Bromberg, 2007), and some are also iconic.

2.0 Current Study and Method

The current study will collect quantitative data pertaining to words from the Qur'an. This will be conducted as two experiments. The first experiment will shed light on how Arabic and non-Arabic speakers perceive Qur'anic words to be through a rating task. Experiment Two will be a four-option forced-choice multiple selection task, conducted with non-Arab speakers, and will look at the meaning transparency of foreign Arabic word meanings in the Qur'anic Script.

Experiment One, the rating task, asks participants to listen to words from the Qur'an, and to rate the iconicity level of each word on a scale of 1 to 7, as measures of least to most iconic, respectively. This will be used to collect average numerical rating scores—normed data—across 100 words from the Qur'an. Collecting normed data across many participants holds many advantages, primarily the elimination of experimenter bias. Also, by using a large pool of participants, experimenters need not rely on the choices of one or two minds, which can create potentially ungeneralizable results (Winter, 2019b), as there is a growing amount of evidence that people differ in both their linguistic and conceptual systems (Dąbrowska, 2015). Instead of relying on an experimenter's single, subjective choices, utilising the wisdom of the crowd helps to aggregate over the responses from different individuals and thus better achieve highly generalizable claims (Winter, 2019b). In theory, an entirely arbitrary language rated under perfect conditions should mean the *average* score of the *average* word be 4 (with higher scores inferring greater iconicity than average, and lower scores meaning lower than average iconicity levels). Experiment One aims to see how close to this average the words in the Qur'an are rated.

The second experiment will use the same 100-word stimuli but will instead use a multiple choice design: participants will listen to Qur'anic words and be asked to choose from four meaning options, with only one of the four options being the target or correct meaning. This design has been employed in many guessing studies (e.g., see Dingemanse et al., 2016; Taylor & Taylor, 1965) with the linking assumption being that if participants consistently guess the meaning of a word without knowing it, then there must be something (iconic) about the form itself that conveys the meaning.

The terms *forced-choice* and *guessing* will both be used through this paper in the following manner: whilst there will not be a *free* guessing task, i.e., with no set choices, there will be *closed* guessing, where participants are given four options. In this sense, participants are

effectively guessing which of the four choices they believe to be correct. Whilst it is forced-choice from the eyes of the experimenter, it is a closed guess from the perspective of the participant.

The two experiments will be used to triangulate iconicity ratings and results, as opposed to simply utilising one design type, with the aim of increasing construct validity (Brown, 1996), or the degree to which a test measures what it claims to be measuring.

2.0.1 Hypotheses

2.0.1.1 Rating hypothesis

The core investigation here is that of word category differences (the term *lexical categories* has been avoided as there will be a mixture of categories that transcend typical lexical parameters; see Chapter 2.1).

Perry et al. (2015) conducted a rating study with English speaking participants rating English words for iconicity. Their study presented an Adjective > Verb > Noun hierarchy in terms of mean iconicity ratings. This was expanded upon by Winter et al. (2017a), a study in which native English speakers rated 3001 words, presenting a Verb > Adjective > Noun hierarchy. In both studies, we find adjectives being rated higher than nouns, and verbs being rated higher than nouns.

Perry et al. (2015) also conducted iconicity rating tests with native Spanish speakers rating Spanish words in their study. They found an Adjective > Noun > Verb hierarchy.

Comparing all these studies then, Adjectives are found to be relatively most iconic, and Verbs more varied. Typologically, there is a difference between languages such as English and Spanish. English encodes the motion of a verb's meaning within the word itself, whilst Spanish encodes this in a separate word (cf. Chapter 1.1). Results showed that English verbs, which tend to express manner, were rated as relatively iconic, whereas Spanish verbs, which tend to lack manner information, were rated as relatively less iconic.

Arabic is more like English in that the verbs are highly conjugational and encode all important meanings; Arabic does not rely on external adverbs in the sentence as in Spanish. Hypothetically then, at least insofar as native speaker ratings, Arabic should rate verbs relatively highly, in line with English.

Typically, sound concepts are more prone to being expressed as verbs, which is argued to be because sound concepts are ‘inherently more dynamic, motion-related and event-based’ (Lievers & Winter, 2018). Conceptual support for this also comes from studies into sign language. Manual actions are found to be particularly amenable to iconic expression in languages such as ASL and BSL (see Perlman et al., 2018), and ‘the use of iconic words to represent vocal tract actions in spoken languages [such as yell and hum] can be seen as an analog to the iconic representation of various kinds of manual actions in signed languages’ (ibid.). We may see heightened levels of perceived iconicity in words that communicate motion, ideophones and perhaps even onomatopoeic verbs.

2.0.1.2 Forced-choice experiment hypothesis

All things being equal, when presented with four seemingly arbitrary choices, it would be expected at chance rate that participants choose the correct option somewhere around 25% of the time, i.e., 1/4. If however the target word in this case is particularly sound-symbolic and in some way facilitates ‘recognition’ for participants (be that due to phonemic, acoustic or onomatopoeic qualities within the word making it sound like what it means), results may show this percentage to in fact be higher, pointing to the presence of iconicity.

It must be noted that this experiment also functions as a tool for comparison and triangulation. Hypothetically, both experiments will show similar results with the same participant groups. If both experimental designs, that is rating and forced-choice, supposedly tap into the same construction, the two sets of results should hypothetically correlate with each other.

2.1 Stimuli

The study presented participants with 100 words from the Qur'an. Audio clips were outsourced instead of recorded for the experiment. This was to avoid any experimenter effects and/or (un)intentional prosodic influence from the one being recorded (e.g., see Nygaard et al., 2009). Audio was in MP3 format with participants asked to answer questions based on each stimulus.

The 100 stimuli created five categories (twenty words in each category). The categories were Nouns, Verbs, Adjectives, Iconic words, and Phonaesthemes. The twenty most common nouns, verbs and adjectives from the Qur'an were chosen, in order of frequency, as found in the Qur'anic Arabic Corpus, an online corpus constructed by the University of Leeds (<https://corpus.quran.com/>). The criteria used to choose the 'Iconic words' and 'Phonaesthemes' categories will be discussed in Chapters 2.1.4 and 2.1.5 respectively (the term *ideophone* has deliberately been omitted here due to linguistic definition choices explained later in Chapter 2.1.4; additionally, Iconic Words here are considered distinct from Phonaesthemes because this will be a replacement label for one understanding of ideophoncity; more generally it can be argued Phonaesthemes are types of iconic words).

All audio files were taken from Quran.com. As of 14th January 2020, all audio are available from <https://www.quran.com>. Translations are adapted from Hans Wehr 4th edition Arabic-English (Cowan & Wehr, 1979) and transliterations, whilst not shown to participants, are unmarked in this thesis to allow ease of reading for the non-native speakers (the unedited Arabic is also provided throughout the paper for accuracy).

After extracting audio of the 100 words from www.quran.com, some of the audio files required clipping. Two of the clips had to be trimmed down to remove the superfluous *wa* conjunction preceding the word (e.g., in verb number 8, *ataa*). In all instances of audio editing (see others later), Audacity (Team, 2010) was used to trim the MP3 files.

At other times, the most suitable audio file for a word had to be chosen from that word's multiple variants of declinable endings. This is due to the nature of declension in Arabic word forms, and this variation was always regarding the ending inflection of the word in question. The standard ending inflection for nouns in Classical Arabic is the singular nominative indefinite *-un* ending. In most cases, this was the form chosen, and so for the majority of nouns, the audio used to represent the word was one where the ending was *-un*. When the word did not appear in this form at all in the Qur'an however, the next most common inflected ending was used. This was

the case with *rabb* (*Lord*) as this word only came in syntactically definitive *-u* constructions, and never with the default *-un* inflection (as this word does not appear in the indefinite form). This was also the case with the words *ahl* (*family*), *yad* (*hand*), and *ghayyr* (*other*). The word *sabeeyl* (*way*) never appeared as the nominative *sabeeyl-un* or the accusative *sabeeyl-u*, but only as the genitive *sabeeyl-i*—thus this was the form used.

Some words only appear in the Qur'an with the definite article *al-* (*the*) attached to the start of the word. These words were kept as they appeared with the *-al* unedited with translations including this. Such was the case with the words *ardh* (*the Earth*), *samaaa*¹⁷ (*the Sky*), *naas* (*humanity*), *salaam* (*The Giver of Serenity*), *rajfah* (*the Earthquake*), *ra'd* (*thunder*) and *dhunyaa* (*the lowest level*). They will be transliterated accordingly.

The next few sections will look at the lists of the five categories that comprised the 100 stimuli and the precise criteria used for each category.

¹⁷ The word *samaaa* appeared 119/120 times with *-al*; whilst this was not every instance, it was far more frequent than without, so the stimulus word remained with *-al*.

2.1.1 Nouns

The twenty nouns chosen were the twenty most common nouns in the Qur'an. *Figure 7* shows a list of these twenty words in order of frequency. *Figure 7* does not include the words *rasool* (messenger) with a frequency of 332 (the 5th most common noun), or *mu'min* (believer) with a frequency of 195. These two words were removed from the analysis as they are derivatives of the verb forms *arsala* (to send [a messenger]) and *aamana* (to believe), because these verb forms also appeared in the twenty most common verbs in the Qur'an (Chapter 2.1.2). As mentioned nouns and adjectives stem from the triliteral root verbs in Arabic. The triliteral root of each word is typically the past tense verb, from which all other forms derive, thus to avoid overlap, such as in cases where both the noun and the verb appeared in the twenty most common lists, the verb form was kept and the noun removed. This was the case with *rasool* and *mu'min*.

<u>Arabic word</u>	<u>Unmarked transliteration</u>	<u>Translation</u>	<u>Frequency</u>
رَبِّ	<i>rabb</i>	Lord	975
الأَرْضِ	<i>al-ardh</i>	The Earth	461
قَوْمِ	<i>qawm</i>	People/Nation	383
آيَةٍ	<i>aaayah</i>	Sign	382
السَّمَاءِ	<i>as-samaaa</i>	The sky	310
نَفْسِ	<i>naffs</i>	The self/soul	295
شَيْءِ	<i>shayy</i>	Something	283
كِتَابِ	<i>kithaab</i>	Book	260
حَقِّ	<i>haqq</i>	Truth	242
النَّاسِ	<i>an-naas</i>	Humanity	241
سَبِيلِ	<i>sabeeyl</i>	Way	176
أَمْرِ	<i>amr</i>	Command	166

خَيْر	<i>khayyr</i>	Good/goodness	148
إِلَهِ	<i>ilaah</i>	One worthy of worship	147
نَار	<i>naar</i>	Fire	145
غَيْر	<i>ghayyr</i>	Other	144
قَلْب	<i>qalb</i>	Heart	132
عَبْد	<i>abdh</i>	Slave	131
أَهْل	<i>ahhl</i>	Family	127
يَد	<i>yaddh</i>	Hand	120

Figure 7 - Twenty nouns from the Qur'an.

2.1.2 Verbs

Figure 8 presents the twenty most common verbs in the Qur'an, after the removal of *alima* (frequency 382), *hadhaa* (frequency 144), *ittakhadha* (frequency 124), *abd* (frequency 122), and *zhalama* (frequency 110). These verbs, *alima*, *hadhaa*, *abd* and *zhalama* already appeared in their respective noun-form variants in the Noun category of the experiment(s); also, *ittakhada* was another (intensified) verb conjugation of *akhada*, which already translates to *he took* and appears in the Verbs category. To prevent overlap, these words were removed.

When choosing which variant of the verb form to use, the third person masculine singular form was chosen whenever possible (as this is the original verb form, Watson, 2002), and translated accordingly. This also helped eliminate confounding variables in forced-choice design i.e., if participants realised certain differing endings of words indicated different person/gender constructions then this could have aided choosing and provided potentially unrepresentative results.

Aside from removing the above mentioned words from the stimuli list, the verbs required no trimming or other adjustments.

<u>Arabic word</u>	<u>Unmarked transliteration</u>	<u>Translation</u>	<u>Frequency</u>
قَالَ	<i>qaala</i>	He said	1618
كَانَ	<i>kaana</i>	Was	1358
ءَامَنَ	<i>aaamana</i>	He believed	537
جَعَلَ	<i>ja'ala</i>	He made	340
كَفَرَ	<i>kafara</i>	He covered ¹⁸	289

¹⁸ For *kafara*, which is often translated as *He disbelieved*, the original stem meaning was taken, which is to cover something (Wehr, 1979). From this original meaning of covering, the secondary meaning of covering up the truth in the form of overt disbelief in matters of religion developed over time in socio-religious circles (Lane, 1872).

جَاءَ	<i>jaa-a</i>	He came	278
عَمِلَ	<i>amila</i>	He worked/did	276
آتَى	<i>aaaatha</i>	He gave	271
رَأَى	<i>ra-aaa</i>	He saw	271
أَتَى	<i>athaa</i>	He brought	264
شَاءَ	<i>shaaa-a</i>	He wished	236
خَلَقَ	<i>khalaqa</i>	He created	184
أَنْزَلَ	<i>annzala</i>	He revealed/sent down	183
كَذَّبَ	<i>kadh-dhaba</i>	He lied	176
دَعَا	<i>dha'aaa</i>	He called	170
أَتَقَى	<i>ith-thaqaa</i>	He was God-conscious	166
أَرَادَ	<i>araadha</i>	He intended	139
اتَّبَعَ	<i>ittaba'a</i>	He followed	136
أَرْسَلَ	<i>arsala</i>	He sent	130
أَخَذَ	<i>akhadha</i>	He took	127

Figure 8 - Twenty verbs from the Qur'an.

2.1.3 Adjectives

Figure 9 presents the adjectives used in the experiments. The words *zhaalim* and *haqq* were removed due to overlap: other conjugational variants of these words appeared in the Noun/Verb categories. In Arabic, adjectives are a subset of the larger *ism* grammatical class (Holes, 2004) of which nouns are also a subset. Thus Arabic adjectives and nouns share many of the same features, principally that of declension and holding inflections. As such, when considering which inflected endings of the adjectives to choose from, the criteria outlined earlier in regards to nouns were reused.

<u>Arabic word</u>	<u>Unmarked transliteration</u>	<u>Translation</u>	<u>Frequency</u>
رَّحِيم	<i>raheeym</i>	The Most Merciful	112
عَظِيم	<i>'azheeym</i>	The Great	104
عَلِيم	<i>'aleeym</i>	The All-Knowing	101
حَكِيم	<i>hakeeym</i>	The Most Wise	84
الدُّنْيَا	<i>ad-dhunyaa</i>	The lowest level	74
أَلِيم	<i>aleeym</i>	Painful	72
مُبِين	<i>mubeeyn</i>	Clear/transparent	119
عَزِيز	<i>azeeyz</i>	The Most Mighty	101
شَدِيد	<i>shadheeydh</i>	Stern	36
كَبِير	<i>kabeeyr</i>	Large	32
عَفُورٌ	<i>gafoowr</i>	Constantly forgiving	29
كَرِيم	<i>kareeym</i>	Noble	28
قَلِيل	<i>qaleeyl</i>	Little (in quantity)	27
بَصِير	<i>basweeyr</i>	All-Seeing	20

كَثِيرٌ	<i>katheeyr</i>	A lot	21
		The More/Most	
أَعْلَمُ	<i>a'lam</i>	Knowledgeable	16
مُجْرِمِينَ	<i>mujrimeeyn</i>	Criminals	8
سَمِيعٌ	<i>sameey'</i>	All-Hearing	8
صَالِحٌ	<i>saalih</i>	Virtuous/Pious	5
السَّلَامُ	<i>as-salaam</i>	The Giver of Serenity	1

Figure 9 - Twenty adjectives from the Qur'an.

2.1.4 Iconic Words

To choose iconic words from the Qur'an, Bahaa-Eddin's (2015) study on ideophones was taken as a starting point. The intention was to either provide empirical support to Bahaa-Eddin's claims, or present quantitative data working against his choices. Bahaa-Eddin holds the position that ideophones are primarily highly iconic or mimetic words that are depictive of sensory imagery. In this, he is less stringent than Dingemanse (Dingemanse et al., 2015, 2016) insofar as the definition of the *ideophone*, which, for Bahaa-Eddin does not necessarily have to contain specific characteristics such as reduplication (as some linguists maintain e.g., see Samarin, 1965).

As such, Bahaa-Eddin identifies a number of 'ideophones' and ideophonic phrases, which would generally be labelled as sound-symbolic or iconic, if not ideophonic, by the larger linguistic community. For the Iconic Words category in the present study then, 16 of Bahaa-Eddin's ideophones (now on referred to as iconic words) were taken.

However, this may raise two questions which will now be addressed: (1) why call the category Iconic Words as opposed to ideophones? (2) why only 16? Firstly, the reason that this category is not explicitly being referred to as ideophones, as Bahaa-Eddin describes them, is because more stringent definitions would not permit all of Bahaa-Eddin's 'ideophones' to be classified as such, therefore the more inclusive term 'Iconic Word' has been used for this paper. As for the restriction to only 16 words, the reason is because from Bahaa-Eddin's study, words were chosen which did not come in multiple variants and were not part of a larger lexical construction. For the present study, this provided only 16/20 stimuli words: whilst Bahaa-Eddin seemingly compiled over 57 ideophones from the Qur'an, when excluding variants of the same root word, excluding for plurals and other overlaps, there were but 16 entirely unique words. Therefore to fill the gap, the remaining 4 were chosen by me personally. These were chosen through reading the Qur'an and listening for words which sounded, admittedly subjectively, symbolic of that which they represented, due to the inclusion of phonemic qualities discussed in Chapter 1.1.

Figure 10 presents the twenty Iconic Words—the first 16 from Bahaa-Eddin and the last 4 chosen by me; the stimuli are presented in this exact order and here do not appear by frequency.

<u>Arabic word</u>	<u>Unmarked transliteration</u>	<u>Translation</u>	<u>Frequency</u>
زَيْغٌ	<i>zaygh</i>	Perversity	1
صِرَاطٌ	<i>siraath</i>	Path	45
قَرَارًا	<i>qaraa raa</i>	Stable abode	9
الرَّجْفَةُ	<i>ar rajfah</i>	The earthquake	4
غَيْظٌ	<i>gayzh</i>	Rage	6
ضُرٌّ	<i>durr</i>	Hardship	19
بِسَاطٍ	<i>bisaataa</i>	A spread	1
بَثًّا	<i>bath tha</i>	He dispersed	5
يَنْعِقُ	<i>yan'iq</i>	To screech/croak	1
قَصَمْنَا	<i>qasamnaa</i>	We shattered	1
طَحَاهَا	<i>tahaahaa</i>	He spread/expanded something ¹⁹	1
مَسَّ	<i>massa</i>	He touched	56
هَيَّيْنِ	<i>hayyin</i>	Easy	3
هُونٍ	<i>hoown</i>	Humiliation	4
حَدِيدٍ	<i>hadeeydh</i>	Iron	6
الرَّعْدُ	<i>ar-ra'd</i>	Thunder	2
أُغْرِقُ	<i>ughriqu</i>	They (were) drowned	17
سَكِينَةٌ	<i>sakeeynah</i>	Tranquility	6
وَقَارًا	<i>waqaaraa</i>	Grandeur	1

¹⁹ The word *Tahaahaa* only appears in the Qur'an once with the pronoun attached and so was left unedited and translated accordingly.

Figure 10 - Twenty iconic words from the Qur'an.

2.1.5 Phonaesthemes

Abdulsada (2019) collects examples of 45 phonaestheme clusters (double morpheme onsets) that he identifies in Modern Standard Arabic (MSA). Similar to Bahaa-Eddin (2015), the phonaesthemes were subjectively chosen, or as he mentions 'self-generated', 'without any frequencies' and 'based on the researcher's own thorough analysis'. Nonetheless this was considered a good, if not the best, place to start to locate phonaesthemes in the Qur'an as there did not appear to be any previous body of work solely dedicated to identifying Qur'anic phonaesthemes. Thus Abdulsada's MSA double morpheme onsets were used to work backwards, as a lot of MSA words stem from Classical Arabic (Simons & Fennig, 2017).

Abdulsada's 45 phonaesthemes clusters were cross referenced with potential Qur'anic equivalents through the Qur'anic Arabic Corpus dictionary. For example, Abdulsada identifies the onset cluster *ga-la*, and this sequence, Abdulsada claims, gives a sense of closing, wrapping, or enclosing (Abdulsada, 2019) e.g., in MSA: *galaqa* (to close), *galafa* (to wrap) and *galada* (to tighten). In the Qur'an's use of Classical Arabic, it was found that *galaqa* and *galafa* did appear in the Qur'an with the meaning of *to close* and *to wrap*, but *galada* (to tighten) did not come in the Qur'an at all and so was omitted. This process of cross-referencing was repeated for all of Abdulsada's 45 MSA phonaesthemes clusters, filtering through phonaestheme onsets which do and do not appear in the Qur'an. From those that did, twenty were chosen for the current study.

Each of the twenty words represent a different onset cluster identified by Abdulsada, with the aim of focusing on breadth of phonaestheme as opposed to multiple instances of single phonaestheme being tested (e.g., instead of using multiple phonaesthemes from the *-gala* onset category, a single phonaestheme was taken from twenty different categories to comprise the twenty words). *Figure 11* presents twenty phonaesthemes identified in the Qur'an that matched Abdulsada's MSA equivalents (cf. Abdulsada, 2019:5-16).

<u>Arabic word</u>	<u>Unmarked transliteration</u>	<u>Translation</u>	<u>Frequency</u>
--------------------	---------------------------------	--------------------	------------------

غَلَقَتْ	<i>gallaqati</i>	She closed	1
بَرَزُوا	<i>barazoo</i>	They went forth	5
ابْتَلَعِي	<i>ibla'ii</i>	Swallow	1
جَسَدًا	<i>jasadan</i>	Body	4
جَمَعُوا	<i>jama'uww</i>	They gathered	22
حَرَّ	<i>harr</i>	Heat	3
خَشِيَ	<i>khashiya</i>	He feared	40
خَرَجُوا	<i>kharajoow</i>	They went out	53
رَجًّا	<i>rajjaa</i>	(a) Shaking	1
رُكْبَانًا	<i>rukbaanaa</i>	Riding	1
رُدَّتْ	<i>ruddat</i>	Returned	36
يَكْبِتُهُمْ	<i>yakbitahum</i>	He suppresses them ²⁰	3
قَطَّعْنَ	<i>qata'na</i>	They cut	29
هَلَكَ	<i>halaka</i>	He perished	5
تَنْهَرُ	<i>tanhar</i>	Repel	2
زَلَلْتُمْ	<i>zalaltum</i>	You slipped	2
عَاصِفٌ	<i>'aasif</i>	Stormy	2
هَزَّ	<i>huzzi</i>	Shook	1
كِسْفًا	<i>kisfaa</i>	Portion	1
هَزُّوا	<i>huzuwaa</i>	Ridicule	11

Figure 11 - Twenty phonaesthemes from the Qur'an.

²⁰ The word *yakbitahum* only appears (in the active tense, as opposed to passive, which would change the meaning from that being analyzed) in the Qur'an once with the pronoun attached; thus it was left unedited and translated accordingly.

Abdulsada's article identifies onsets comprised of two consonants and presents them, without inflection, as two out of the three trilateral radicals that comprise a typical Arabic word. As such, when choosing the inflectional variant(s) to use for the present study, when the word only appeared in one inflected form, that form was taken. When there were multiple forms to choose from, the past tense singular, otherwise plural default were taken (in that order, depending on availability; duals never appeared in the absence of a singular or plural). Whilst some words show higher frequencies, these are inclusive of present tense verb conjugations, which begin with *-y/-t* as a mark of present tense, and change the onset sound from the intended phonaestheme. Therefore, whenever possible, the past tense form was taken so as to keep the sound of the phonaestheme onset the same as intended. This could not be done with the two-letter/morpheme onset *na-ha* as it only appeared in present tense form (*tanhar*; *repeh*—see *Figure 11*) in the Qur'an. The same occurred with *yakbitahum* (*He suppresses them*) which in the past tense begins with *ka-ba*.

2.2 Apparatus & Design

Both experiments were run on Qualtrics (Qualtrics, 2020), using a questionnaire or survey format. The first consisted of 100 iconicity ratings, and the second, 100 multiple-choice questions in which participants had to choose the meaning of the stimulus word from four possible options. For the multiple-choice questions, i.e., forced-choice questions, participants were assigned to one of three lists. Each list presented participants with a different set of randomized options per question to counterbalance potential list-effects. Each stimulus therefore had three different sets of randomized options (with the target word being consistent in all). In all lists, the order of the 100 questions were also randomized. When participants began the experiment, Qualtrics was programmed to assign participants to one of three blocks, each representing one of the three lists. This assignment was balanced to allow for an equal subject count for each list. They were asked to listen to an audio clip of an Arabic word and were given four options to choose from. Instructions directed them to use their intuition and choose whatever they believed sounded like the right meaning (an example has been added below).

You will be asked to choose the meaning of an unknown Arabic word, from a choice of four. You must listen to an audio clip before choosing your answer.

For example, you may be asked to choose the meaning of the made-up word frimso. Your four options may be: dog, cat, mouse, ferret.

Please listen to the audio as many times as needed before making your choice; you must simply choose the meaning from your personal preference based off of what the word sounds like it might mean. When making your choice, focus on the sound of the Arabic words and the meaning itself, rather than any correspondence between the sound of the Arabic word and the English translation. In the example above, please do not choose frimso -> ferret just because ferret in English contains the same starting sounds as frimso. Instead think about what you believe the word meaning is.

Participants took part in one of the two experiments (namely, the rating study, or the multiple-choice guessing task) and in all experiments the same 100 audio files were used; subjects required headphones/earphones for all experiments. The surveys were carried out on both computer and mobile platforms.

There were 100 words taken from the Qur'an. These 100 words created the pool of options for the forced-choice task, with a random 3 words (from the pool of 100) being assigned along with the target word.

In both studies, not only were participants given their normal choices, but also a 'clapping' option. In some trials, participants would hear an audio clip of clapping as opposed to an Arabic stimulus; the initial instruction briefing told participants that when this clapping audio was heard, they should choose the *Clapping* meaning alternative in the multiple choice experiment, or 7 in the likert-scale rating task. This was to ensure participants were attentive to each audio stimulus and were not making choices at random without listening, as was found in the pilot runs.

Lastly, stimuli were not presented orthographically on-screen in any way, either in Arabic, in English translation, or in transliteration. Instead they were only presented as a clickable audio MP3 file. A frequent concern in sound-symbolism studies is the potentiality for confounding orthographic influences, for example, participants might only consider the sound [b] to be rounder than the sound [k] in kiki/bouba because the letter *b* is rounder than the letter *k* (Lockwood & Dingemanse, 2015). The current study addressed this by the complete omission of the written word when presenting stimuli, be that Arabic, English translation, or

transliteration. Participants only heard the sound of words via audio in aims of reducing orthographic variables.

2.3 Subjects and Procedure

2.3.1 Pilots

A number of pilot studies were run prior to the experiments. Pilot A contained 10 questions, comprising a mix of rating and multiple choice questions chosen from the final surveys. The pilot yielded 27 responses, and participants of the pilot were not used again in the final experiments. The pilot test led to some minor amendments in labelling the rating scale, as well as changes to examples in the briefing stage.

Pilot B was a pilot of Experiment One, and led to amendments in the instructions given to participants, as from this it was realised that participants were not utilising the full extent of the 1-7 scale, and some were choosing only one rating throughout the entire experiment. This pilot also led to a methodological change to the final experiments: 10 clapping response trials were added to both the rating and multiple choice task to ensure participants were paying attention. By adding ten of these trials to both Experiment One and Two, the question count became 110 in total for each (instead of 100). These clapping trials were removed from the final results.

2.3.2 Experiment One - Rating Task

Experiment One was split into three groups of participants. 25 participants made up the first group. 22 participants comprised the second group, and 26 participants the third group.

Participants were surveyed regarding multiple demographic factors, principally, their proficiency in different languages. Participants identified their L1 and any other languages that they spoke, along with their proficiency level for each language. This data was then used to split Experiment One into the English/European group, Arabic Speakers group and Influenced by Arabic Group.

The first group were participants whose native tongue was English, but whilst also having no knowledge of Arabic nor languages that had come into significant contact with/were heavily influenced by Arabic. An example of a language heavily influenced by Arabic is Turkish (as Turkish contains many Arabic loanwords due to heavy religious and culture exchange). This first group of participants was known as the English/European group (a clunky name, granted,

but the most apt as it comprised a range of speakers from French and even German L1 backgrounds). For this group, the majority were English monolinguals. In the instances when participants did speak or have access to an L2, this was either BSL or another European language such as French or German. None of the 25 participants in this group had any knowledge of Arabic or languages that were heavily influenced by Arabic (granted even languages such as English do contain some loanwords from Arabic; this is unavoidable and no language is free from cultural interchange).

The second group of 22 participants were those who were proficient in Arabic. These participants were not always Arabic L1 speakers, or even Arab monolinguals: many participants in this group spoke English as their L1, but they identified their own Arabic proficiency level as high or *native-like* in the demographic survey preceding the study. In some cases, these participants spoke other languages such as Tigrinya, Portugese and Gujurati. The most salient and defining characteristic of this group however is that they were proficient in Arabic, as opposed to the other two groups.

The third group consisted of 26 participants who spoke any language heavily influenced by Arabic (but not Arabic itself). The participants/languages which fit the category of 'heavily influenced by Arabic' were not difficult to operationalize after the first two groups of participants were divided. The remaining participants all spoke an Indo-Aryan language fluently: these participants spoke languages such as Urdu, Punjabi, Bengali and Mirpuri—though their L1 was often still English. This group had little to no *direct* knowledge of Arabic nor Classical Arabic words, for they identified their own Arabic proficiency as non-existent.

2.3.3 Experiment Two - Forced-choice Task

Experiment Two was run using Amazon Mechanical Turk (AMT) and Qualtrics. 57 participants were recruited through AMT and asked to complete a Qualtrics survey based on Arabic words. The location was restricted to the US. All participants were seasoned AMT users with a HIT approval rate of over 90%. Participants were paid 2.5 USD each; the task took between 15-25 minutes to complete. Participants were primarily American and had no previous knowledge of Arabic words.

2.4 Reproducibility

Data analyses, visualizations and plots were conducted and created using R version 3.5.3 (R Core Team, 2019). All data and code (including R Scripts) are available in the following publicly accessible repository: <https://osf.io/arzfs/>; tables and datasets deemed too long to attach as figures or tables in the main thesis have been appended at the end and cross-referenced throughout Chapter 3.

3.0 Results

The current chapter will firstly present the results of the two Pilots. Thereafter the results of Experiment One (ratings) will be presented, initially as an overall distribution across all three groups without specifying category i.e., this will be a review of the overall means and standard deviations across the three participant groups without looking at grammatical category averages.

After presenting these overall means and averages and summarizing the scores across the three participant groups, the specific category results for all groups will be presented in raw form. These base results of Experiment One as well as those of Pilot B will then be combined through *z*-score standardization and considered as one data pool (this applies to the English/European participant group only; see Section 3.2.5). The three participant groups will then be compared to each other in regards to word category differences post-standardization. The top 10 most iconic words in each participant group will be shown for Experiment One. Following this, the guessing accuracy findings of Experiment Two will be discussed and compared to the rating results of Experiment One.

3.1 Pilot results for both Experiments

Pilot A was conducted on friends and family; as the purpose of this pilot was to test for general instructional and methodological errors or ambiguities, results were unrepresentative of the main test-set. Not only did these participants have a high working knowledge of Arabic or highly influenced languages, thus invalidating data sets through conflation between intended participant groups but the pilot itself was also only composed of five multiple choice questions and five rating questions, and so was not comparable to later pilots and experiments. The results for this pilot have thus been omitted.

Pilot B was conducted and designed specifically for Experiment One and was conducted on 26 participants. The results of Pilot B showed that the average word rating across participants was 2.27 (*SD* = 0.63). Results from this pilot showed that ratings are generally scaled downward in comparison to the participant data sets for Experiment One but were nonetheless still highly correlated between Pilot B and Experiment One ($r = 0.82$). Whilst these particular results will

not be discussed in detail, they are later standardized along with Experiment One and combined in Section 3.2.5. From this point on, any mentions of ‘pilot’ will refer to Pilot B as it is the only pilot data used.

Experiment Two was initially piloted (in the same vein as Pilot A) by a handful of friends and family to check for internal, methodological or instructional errors/ambiguities. This was followed by running a preliminary batch through Amazon Mechanical Turk which consisted of 9 participants. All participants were English-speaking monolinguals based in the United States. This preliminary batch for all intents and purposes *functioned* as a pilot, but as no problems were discovered and no methodological changes succeeded this, the results from the first 9 participants were seamlessly incorporated into the final dataset as seen in Section 3.3.

3.2 Experiment One - Ratings

This first set of reports will outline raw (unstandardized) results. The first group were the 25 participants who only spoke English or a European language; on a scale of 1-7, their average Iconicity word rating across the 100 Qur'anic words was 3.17 ($SD = 0.68$).

The second group of 22 participants were those who were proficient in Arabic; the average word rating across the 100 words in this group was 4.75 ($SD = 0.48$).

The third group consisted of 26 participants who spoke any language heavily influenced by Arabic (but not Arabic itself); the average word rating across all 100 words in this group was 4.03 ($SD = 0.66$).

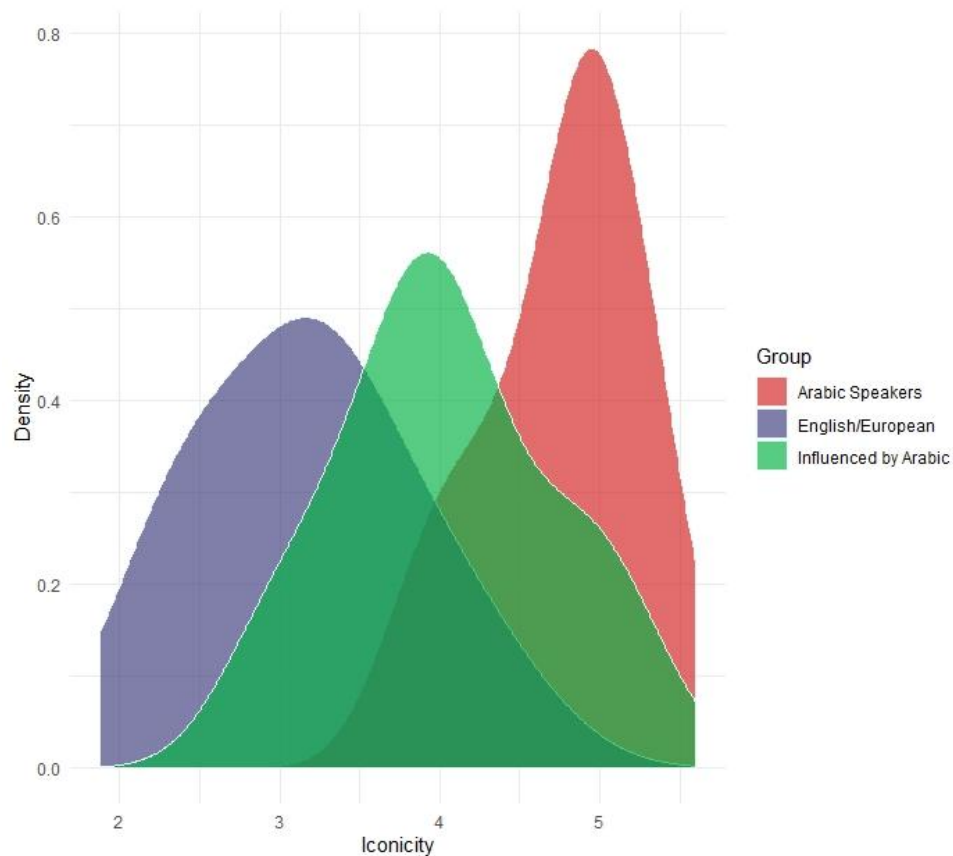


Figure 12 - Density of iconicity ratings across the three groups of participants in Experiment One; x-axis showing rating and y-axis, density.

Some salient differences between groups are immediately visible. The only words which were rated 'highly' (e.g., had a normed rating average of 5.5+) were all rated such by Arabic speakers alone. Conversely, the only words which received an average of 2.5 and below, were all rated such by English-speaking participants only. *Figure 12* presents a density plot illustrating the distribution of iconicity ratings across the three groups.

3.2.1 Overview of Word Category differences across the three groups

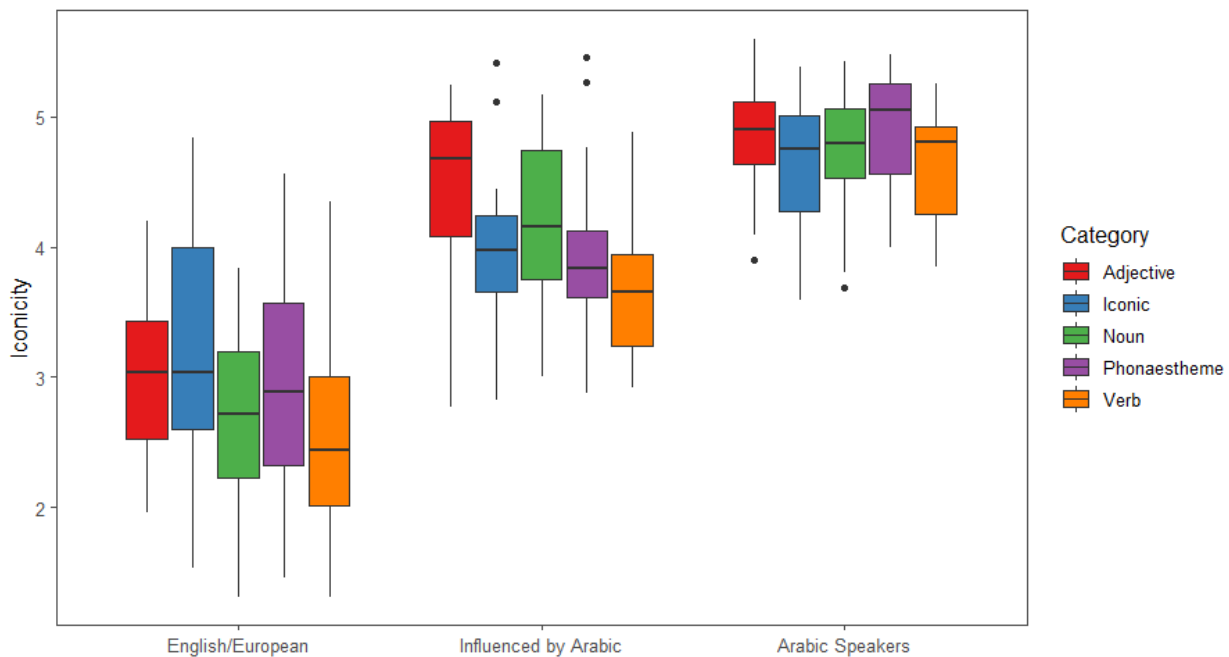


Figure 13 - Box plots of Word Category scores across all groups in Experiment One

Figure 13 presents box plots of all three groups and their word category scores presented prior to standardization. This will be broken down by specific groups in Chapters 3.2.2 through 3.2.4.

3.2.2 English/European Group

Considering that this group was in many respects the main focus of the study, their perceptions of Arabic words (that were in essence completely foreign to them) provided what was considered the best mechanism to remove cultural biases in the rating process that may be found amongst other participants (e.g., Arabic speakers with previous exposure to the language will naturally be influenced by their previous linguistic contact). This was the intended control group and we see an Iconic / Adjective / Phonaestheme / Noun / Verb hierarchy (hierarchy henceforth refers to order of most highly rated word categories).

Table 3 - Average Iconicity ratings in the English/European Group (alphabetized)

Category	M	SD
Adjective	3.34	0.52
Iconic	3.49	0.8
Noun	3.01	0.54
Phonaestheme	3.26	0.73
Verb	2.76	0.59

3.2.3 Influenced By Arabic Group

Different from the previous, this group presented an Adjective / Noun / Phonaestheme / Iconic / Verb hierarchy. The Phonaestheme and Iconic categories contained two extreme values²¹ each. In the Phonaestheme category, the words *qata'na* (they cut) and *harr* (heat) were both rated 5.5 and 5.3 respectively. In the Iconic category, the words *ar-ra'd* (thunder) and *sakeeynah* (tranquility) both scored 5.4 and 5.1 respectively. These words will be returned to in Section 3.2.6, the top 10 words in each group, and discussed in detail in Chapter 4.

Table 4 - Average Iconicity ratings in the Influenced By Arabic Group (alphabetized)

Category	M	SD
Adjective	4.48	0.67
Iconic	3.94	0.68
Noun	4.17	0.61
Phonaestheme	3.98	0.64
Verb	3.63	0.49

²¹The term *outliers* has been deliberately avoided. Words that fall outside the range of boxplot whiskers are typically labelled outliers, but Winter (2019b) adopts the term *extreme value*, as *outlier* 'suggests that something is qualitatively different from the other data points, which is often used to justify exclusions [and] using the term 'extreme value' implies that the same underlying process has generated the extremity'.

3.2.4 Arabic Speaking Group

From comparing means, this group showed a Phonaestheme / Adjective / Noun / Iconic / Verb hierarchy. The Adjective and Noun categories contained one extreme value each. In the Adjective category, the word *ad-dhunyaa* (the lowest level) and in the Noun category, the word *an-naas* (*humanity*) were both rated 3.6 and 3.9 respectively. These, along with other low scoring words will be discussed further later, which correlates the frequency of Arabic words and perceived levels of iconicity.

Table 5 - Average Iconicity ratings in the Arabic Speaking Group (alphabetized)

Category	M	SD
Adjective	4.85	0.46
Iconic	4.66	0.54
Noun	4.72	0.52
Phonaestheme	4.9	0.47
Verb	4.64	0.41

3.2.5 Standardized Scores: Comparing the three groups

This section presents the results after z-scoring (to allow for the direct comparison of otherwise incomparable groups—incomparable in that the groups have different linguistic exposures to Arabic and varying mean rating scores) and the subsequent cross-group trends and patterns.

As there was a Pearson's by word correlation of 0.82 between the Iconicity scores for both the Pilot and Experiment One, they were merged for the English/European group (henceforth referred to in totality as simply the English/European group). All results from all groups were then standardized through Altman z-scoring (i.e., a linearly transformed number, positive or negative, measured in terms of standard deviations from the mean score of that particular group), allowing for direct comparison across the groups.

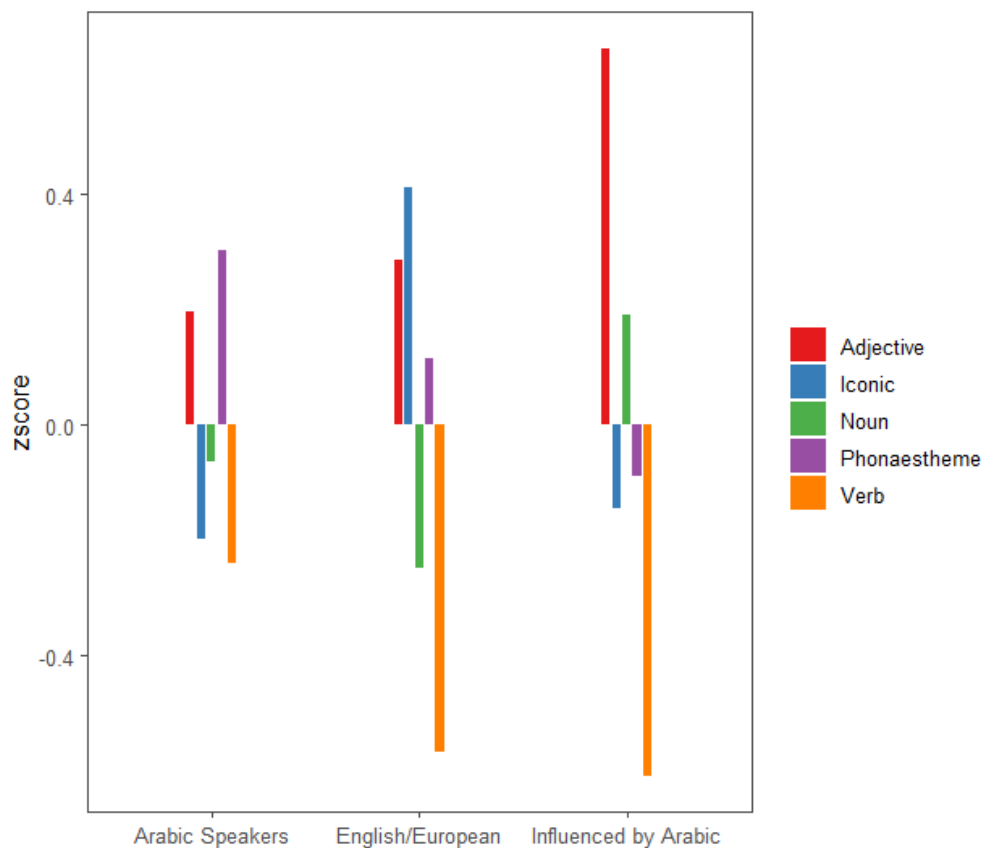


Figure 14 - Altman z-scores for each category of word across the three participant groups in the rating task, allowing for comparison between groups.

As z-scoring compares all data values to the mean of that group, the scores all centre around the same point; thus the overall mean word scored across the 100 words for each group are 0 and standard deviations remain the same. However, when comparing word categories specifically, there appeared to be a consistent difference in that Adjectives and Phonaesthemes were all rated higher than Verbs across all groups, though this difference is less pronounced amongst Arabic Speakers (see *Figure 14*, based on mean scores). Verbs are on average always rated the lowest—this is found across all groups. Iconic words only appeared particularly *iconic* to the English/European participants, being their highest rated grammatical class overall with an average z-score of 0.4. It is worth noting however that mean scores do not tell the full picture, and though the ‘average’ rating for an Iconic word was 0.4 when normed, there is no such thing as an *average* word; this will be discussed in detail in Chapter 4.

There did not appear to be many discernible trends that held true for multiple word categories: for Adjectives, the Arabic Speakers and English/Europeans scored similar to each other whilst the Influenced by Arabic Group exhibited a slightly higher score. This illustrates the large deviation in ratings amongst the participants in the English/European group, with some ‘Iconic’ words being rated lower than the lowest rated Adjective. The standard deviation for Adjectives in this group was also less pronounced and thus ‘tighter’ to the mean. In fact, the SD for Iconic words after combining Pilot/Main English speakers was 0.93, and the SD for Phonaesthemes in the English/European group was 0.79. In comparison, the SD for Iconic words in the Arabic Speakers and Influenced by Arabic Group was 0.54 and 0.68, and for Phonaesthemes, 0.47 and 0.64 respectively. The English/European group therefore exhibited the most deviation in regards to scoring these two parts of speech.

In the Iconic category, both Arabic Speakers and Influenced by Arabic speakers scored the same average, -0.20 and -0.15 respectively, whilst English speakers scored relatively higher at 0.41. Potential reasons for this will be discussed further in the discussion.

3.2.6 Top 10 words rated across the three groups

This section presents the top 10 rated words for each of the three groups of participants, including normed average and their iconicity z-score. Amongst the Arabic speakers, there were 2 Adjectives, 3 Iconic words, 2 Nouns, 3 Phonaesthemes and 0 Verbs in the top 10 rated words.

In the English/European group of participants there were 2 Adjectives, 6 Iconic words, 0 Nouns, 2 Phonaesthemes and 1 Verb.

The Influenced by Arabic group contained 4 Adjectives, 2 Iconic words, 2 Nouns, 2 Phonaesthemes and 0 Verbs. Previous results have shown the English/European group had the most variance in ratings; this can similarly be seen reflected in their top 10 words as they are the only group to have all categories of words rated in their top 10.

Arabic Speakers:

- (1) the Adjective, *The Great* ('azheeym) at 5.60 (z-score of 1.75)
- (2) the Adjective, *Stern* (shadheeydh) at 5.50 (z-score of 1.55)
- (3) the Phonaestheme, *Shook* (huzzi) at 5.48 (z-score of 1.50)
- (4) the Noun, *Truth* (haqq) at 5.42 (z-score of 1.40)
- (5) the Phonaestheme, *Returned* (ruddat) at 5.42 (z-score of 1.38)
- (6) the Noun, *Heart* (qalb) at 5.41 (z-score of 1.36)
- (7) the Noun, *A Shaking* (rajjaa) at 5.41 (z-score of 1.36)
- (8) the Iconic Word, *They (were) drowned* (ughriqu) at 5.38 (z-score of 1.30)
- (9) the Iconic Word, *He touched* (massa) at 5.36 (z-score of 1.26)
- (10) the Iconic Word, *Thunder* (ar-ra'd) at 5.35 (z-score of 1.23)

English Speakers:

- (1) the Iconic Word, *Tranquility* (sakeeynah) at 4.84 (z-score of 2.45)
- (2) the Iconic Word, *He spread/expanded something* (tahaahaa) at 4.56 (z-score of 2.03)
- (3) the Iconic Word, *Thunder* (Thunder) at 4.56 (z-score of 2.03)
- (4) the Phonaestheme, *Stormy* ('aasif) at 4.56 (z-score of 2.03)
- (5) the Iconic Word, *Rage* (gayzh) at 4.36 (z-score of 1.75)
- (6) the Iconic Word, *Humiliation* (hoown) at 4.28 (z-score of 1.63)
- (7) the Phonaestheme, *Returned* (ruddat) at 4.28 (z-score of 1.63)

- (8) the Adjective, *Large (kabeeyr)* at 4.2 (z-score of 1.51)
- (9) the Iconic Word, *Grandeur (waqaaraa)* at 4.16 (z-score of 1.45)
- (10) the Adjective, *The Great ('azheeym)* at 4.16 (z-score of 1.45)

Influenced by Arabic:

- (1) the Phonaestheme, *They cut (qata'na)* at 5.46 (z-score of 2.13)
- (2) the Iconic Word, *Thunder (ar-ra'd)* at 5.42 (z-score of 2.06)
- (3) the Phonaestheme, *Heart (qalb)* at 5.27 (z-score of 1.84)
- (4) the Adjective, *The All-Knowing ('aleeym)* at 5.24 (z-score of 1.80)
- (5) the Noun, *Book (kithaab)* at 5.17 (z-score of 1.69)
- (6) the Adjective, *The Giver of Serenity (as-salaam)* at 5.16 (z-score of 1.68)
- (7) the Iconic Word, *Tranquility (sakeeynah)* at 5.12 (z-score of 1.62)
- (8) the Noun, *Truth (haqq)* at 5.08 (z-score of 1.56)
- (9) the Adjective, *The Great ('azheeym)* at 5.04 (z-score of 1.50)
- (10) The Adjective, *Stern (shadheeydh)* at 5.04 (z-score of 1.50)

The Adjective *'azheeym (The Great)* appeared in all three groups. The Iconic word *ar-ra'd (Thunder)* appeared in all three groups.

The Adjective, *shadheeydh (Stern)* appeared in both the Arabic Speakers and Influenced by Arabic groups. The Iconic word, *sakeeynah (Tranquil)* appeared in the English/European and Influenced by Arabic groups. The Noun, *haqq (Truth)* appeared in both the Arabic Speakers and Influenced by Arabic groups. The Phonaestheme, *ruddat (Returned)* appeared in both the Arabic Speaking and English/European groups. Chapter 4 will present a detailed discussion on the top 10 words for each group, including possible reasons for their appearance and potential implications.

3.2.6.1 Top 10 words & The Phoneme Similarity Framework

This section will firstly present additional qualitative and quantitative analyses of the top 10 rated words in Experiment One for each group, and thereafter propound my theory of the Phoneme Similarity Framework (PSF) which may explain why some words are rated as more iconic than others. This section, whilst somewhat discursive, has been now placed in the results section due to additions of new result analyses throughout.

The top 10 words for each group largely reflected the overall picture of their ratings: Arabic Speakers' had mainly Phonaesthemes (though an equal percentage was Iconic Words) in their top 10 words, English/European participants had mainly Iconic Words, and the Influenced by Arabic group had mainly Adjectives (cf. Chapter 3.2.6).

As for trends across groups and recurring words between the three sets of participants, we see the Adjective *The Great* ('*azheeym*) appear in all three groups. The Iconic Word *Thunder* (*ar-ra'd*) also appeared in all three groups. But what is it about these words that seem to lend them to an iconic interpretation, or at least rating? Please note that the following hypothesis, whilst argued with data backing in the coming subchapters, will contain my personal, speculative and qualitative analysis; any links between place of articulation and phoneme effects are not empirically grounded. That being said, this section, whilst seemingly more subjective in analysis in regards to phoneme effects and place of articulation effects, draws heavily on Arabic concepts of Arabic phoneme effects as found across Arabic and Qur'anic source texts (also known as *Tajwid* manuals in the science of Qur'an recitation).

The word '*azheeym* begins with a guttural voiced pharyngeal fricative /ʕ/ followed by the emphatic pharyngeal /ðˤ/, with the the entire word on the templatic Adjective pattern common to Arabic adjectives. These three features may individually be somewhat iconic, but combined can create a saliently harsh, significant sounding word. Monaghan and Fletcher (2019) found that /g/ was positively related to concepts of largeness and hardness. Participants may have mapped the /g/ in the translation of *The Great* to the phonemes heard in the audio stimulus. These sounds heard by participants, then connected to the meaning of *The Great*, may elicit a feeling of perceived iconicity, for the phonemes sound harsh and correspondingly 'great'.

The word *ar-ra'd* contains two phonemes that again create jarring and guttural sounds. The tapped or trilled /r/ is an alveolar consonant which has been found to relate closely with concepts of spikiness (Monaghan and Fletcher, 2019). The /r/ phoneme is common to many

languages, but is offset by the presence of the voiced pharyngeal fricative /ʕ/, again a powerful sounding phoneme, foreign to the English language. The distance between these two phonemes is relatively far in that /ʕ/ stems from back in the throat and then the tap or trill is articulated from the alveolar region. This may be likened to the effect of the phonaestheme *gl-* which is thought to symbolize the idea of light refraction (Magnus, 2000); the relatively distant articulation points required to produce a /g/ then /l/ when pronounced may replicate a physical mapping of quick bouncing of light (Bergen, 2004). In comparison, /r/ and /ʕ/ are just as distance as /g/ and /l/ and thus may function in the same way when paired together, a physical mapping creating a ricochet, recoil or rebound sound—again, whilst not empirically grounded as linguistic fact, when compared, this may then match well with or correspond to what participants then saw to be the translation of *ar-ra'd: Thunder* (similarly an aural ricochet, recoil or rebounding sound).

The Adjective, *Stern (shadeeyd)* appeared in both the Arabic Speakers and Influenced by Arabic groups. This word was on the templatic Adjective pattern which corresponded with the adjectival meaning given in translation. There was also a near-match in onset between the two words, starting /s/ and /ʃ/; however the most salient factor may have been the repetition of the postalveolar plosive /d/. Plosive phonemes are significant as they share the features of occlusive articulation, or obstructing airflow in the vocal tract. This creates an explosion of air which sounds powerful and may reflect the sense of the word, *stern*. The repetition of this phoneme would further reinforce this meaning of sternness, similar to how recurrent iconic patterns are found in ideophones cross-linguistically (Perniss et al., 2010).

The Iconic Word, *Tranquil (sakeeynah)* appeared in the English/European and Influenced by Arabic groups. This Iconic Word is on the Adjective templatic pattern. The voiceless alveolar sibilant /s/ has been found to relate positively to concepts of small, soft, slow (Monaghan and Fletcher, 2019), which reflects the meaning given by the translation. Additionally, the pattern contains an elongated, stable /i:/ sound which may reflect the concept of steadiness that the word *tranquility* signifies. Lastly, the word ends with aspirate /h/ which is relatively 'light' sounding and does not contain any guttural or harsh sounds as found in other words, again amplifying the sense of lightness and softness (Cho, 2015). Also, and this is more speculative, the /k/ phoneme is present in both the Arabic and the English which may also have been deemed iconic due to a subconscious perception that the phonemes match or are at least similar.

The Noun, *Truth (haqq)* appeared in both the Arabic Speakers and Influenced by Arabic groups. Monaghan and Fletcher (2019) mention that /g/, the voiced velar plosive, is positively related to concepts of hardness. The voiceless uvular plosive /q/ in *haqq* may be considered a heightened or more impactful form of this—which may be associated with the connotations of *truth* (the cold hard truth, truth being hard to swallow and other semantic associations with truth). The /q/ phoneme also appears twice, ratifying the sound and thus association of stability and truth.

The Phonaestheme, *Returned (ruddat)* appeared in both the Arabic Speaking and English/European groups. This word is again an example of PSF which will now be ‘filled out’ and expounded upon. This theory is defined as follows: when given two words which share the same phoneme(s), a participant’s perception of iconicity will be higher than in words without this similarity; and, if the matching phoneme(s) occur in the onset of both words (e.g., *ruddat* and *returned*), or if there are multiple matching phonemes, the perception of iconicity will be further amplified.

3.2.6.2 The Phoneme Similarity Framework explored

The general acknowledgment of this theory, i.e., the effect of phonemes being systematically similar across words, has been hinted to in the wider iconicity literature (Blasi et al., 2006; Dingemanse et al., 2015, Monaghan et al., 2007), but, to my knowledge, has not been codified or formally delineated as a variable affecting *iconicity ratings* until now. In an aim to formally expound this theory (and possibly falsify it; see Popper, 1963), below are the two most highly rated words in the English/European (pilot)²² and Influenced by Arabic groups:

Group	Word	Arabic
English/European (pilot)	<i>He covered</i> ²³	<i>kafara</i>
Influenced by Arabic	<i>They cut</i>	<i>qata’na</i>

²² The top word from the pilot study is used here because this was when participants were most ‘free’, and instructions had not been refined to specifically guide them to *not* look for phonemic similarities, cf. Chapter 2; the remaining examples in this subchapter will show main study comparisons.

²³ For *kafara*, which is often translated as *He disbelieved*, the original stem meaning was taken, which is to cover something (see footnote 18 for a detailed explanation).

Figure 18 - The highest rated words in the English/European and Influenced by Arabic groups, both demonstrating the PSF for iconicity ratings in non-native speakers.

The first, *kafara* contains the phonemes /k/ and /r/ which match with **covered**. The /f/ phoneme may be argued to also play a factor, being the *voiceless* labiodental fricative as opposed to the voiced /v/; evidence for this is found in Styles & Gawne (2017) in which they posit that phones articulated at the same place using the same articulatory organs are perceptually assimilated to attested phonological targets (e.g., [b] and [p] could be perceived as variants of the single bilabial category /p/).

The /k/ phoneme is also at the beginning of the Arabic word *kafara* and the second syllable of *He covered* (as will be explored later, distance of phonemic similarity can create measurable differences in perceived iconicity). The consecutive order of appearance for these phonemes are also the same order found in the English translation (k, f, r → c, v, r).

The word *qata'na* (*they cut*) contains the uvular /q/, foreign to English but not to Arabic and other languages, as well as the emphatic pharyngealized /tˤ/. Whilst the word may be deemed iconic due to the harshness of the pharyngealized stop or other factors, the fact that phonemes which seem very similar to the target word are also present in the Arabic audio may play a large factor in determining iconicity ratings. To further explore this, a comparison is drawn below across the entire data set (*Table 6*).

When taking the entire 100-word stimuli list into consideration, there are 31 words that can be seen to have either matching, or very similar phonemes in both the Arabic and English counterpart ('very similar' is admittedly vague; this is because the term itself is dependent upon participant variables: to an English speaker, /q/ and /k/ may be considered dissimilar as the entirely foreign uvular does not exist in English, whereas for other participants, as seen below, they may be considered allophones or at least similar sounding variants of the same phoneme). Below, *Table 6* presents the 32/100 words that match the PSF criteria in the English/European group. Matching phonemes were determined through an IPA cross-comparison; any phonemes that were not a perfect match were excluded and have been discussed in the footnotes. Bold green highlights words that match a phoneme in the onset in both Arabic and English (e.g., **Harr** which means **Heat**—both onsets contain /h/). Red highlights words that were not rated above average and so may be argued to not support the effectiveness of the theory.

Table 6 - Words that match PSF criteria in the English/European group

	<u>Word</u>	<u>z-score (rating)</u>	<u>Matching phonemes</u>
1.	Command	0.69	1
2.	Constantly forgiving	-0.06	2
3.	Grave error	0.80	1
4.	He came	0.39	1
5.	He covered	1.16	2 ²⁴
6.	He revealed	0.63	1
7.	He sent	0.57	1
8.	He suppressed them	0.04	1
9.	Heat	1.21	1
10.	Humanity	0.33	2
11.	Humiliation	1.63	1
12.	Large	1.51	2
13.	Little	0.81	2
14.	Lord	0.04	1
15.	Painful	0.05	1
16.	Repel	0.57	1
17.	Returned	1.63	2
18.	Riding	0.69	2
19.	Sky	0.89	1
20.	Stormy	2.04	1
21.	The All-Knowing	0.51	1
22.	The earthquake	1.21	1
23.	The Giver of Serenity	0.33	1
24.	The Great	1.45	1
25.	The Most Knowledgeable ²⁵	0.05	2
26.	The Most Merciful	-0.19	1

²⁴ There was also a third phoneme which may have played a factor, but did not count as a perfect match: f/v voiceless; order is consistent

²⁵ Middle-far and far-far

27.	The Most Wise	-0.07	1
28.	The self/soul	0.86	2
29.	Thunder	2.04	1
30.	Tranquility	2.45	1
31.	Virtuous/Pious	-0.13	1
32.	You slipped	0.45	1

The mean score for words with 1 matching phoneme was 0.77 and for 2, 0.78. In comparison, the highest rated category of words in the rating experiment was Adjectives in the Influenced by Arabic group, which only reached 0.65. The mean score for words with 0 matching phonemes was -0.41.

28 out of 32 words that match the criteria of PSF were rated above the mean. Words 2, 26, 27, and 31 were not rated above average (though not far off considering z-scores ranged from -0.06 to -0.19).

In the Influenced by Arabic group, all the 32 words were rated above average. In this group the z-score for Word 2, *Constantly Forgiving* was 1.32, Word 26, 0.80, Word 27, 1.40, and Word 31, 1.37 (for an analysis of why this may be, see Chapter 4).

An important point to consider is the relative ‘closeness’ or ‘match’ between the Arabic and English. For the purposes of expanding the theory and better defining its tenets, a match in which the phoneme similarity is in the first syllable of both words has been described as close-close (e.g., *Heat* and *Harr*). Participants spoke English as their L1, so the first word used in this comparison is English: when the English translation contains in the first syllable a phoneme which matches the second syllable of the Arabic audio, this has been defined as close-middle (that English, the L1, is the first point of comparison). When it matches the third syllable or later of the Arabic, it is close-far. The placement of the matching syllable for the English word can of course also vary (e.g., if the third or later syllable of the English matches the first syllable of the Arabic, this will be defined as far-close).

The reason for such specificity is that the four words which were not rated above the mean in *Table 6* also did not contain any matches in the first syllable. In fact, the phoneme similarity for Word 2 was far-middle for the /f/ phoneme (*Constantly Forgiving* → *gafoowr*) and far-far for the /r/ phoneme (*Constantly Forgiving* → *gafoowr*); for Word 26 it was middle-far (*The Most Merciful* → *raheeym*); for Word 27 it was middle-far (*The Most Wise* → *Hakeeym*) and Word 31 was far-close (*Virtuous/Pious* → *saalih*).

If the Phone Similarity Effect is at least entertained as being a true variable in the perception of iconicity, this may prove to be why these particular words did not appear as sound-symbolic as the other 28: the phoneme similarities were not close. This can also explain the lower than expected rating for other words such as Words 8, 16, and 25. For instance, Word 8 (*yakbitahum*) was close-far, Word 16 (*tanhar*) was close-far, and Word 25 (*a'alam*) was middle-far in phoneme one and middle-far in phoneme two.

The following 6 entries were not included in *Table 6* because they did not provide a precise phoneme match:

•	He created	-0.72	1
•	He intended	-0.9	1
•	Something	0.66	1
•	Stern	1.34	1
•	They cut	1.28	2
•	To screech/croak	0.91	1

The mean iconicity z-score for these 6 ‘imprecise matches’ was 0.43. The first two, *He created* (*khalaqa*) and *He intended* (*araadha*), contain phonemes that are foreign to English, namely the uvular /q/ and voiced dental-alveolar /d̪/²⁶ respectively. The next two, *Something* and *Stern*, were translations of *shayy* and *shadheedh* respectively, which both contain the /ʃ/ phoneme, close to, but not matching phonemes of the English words’ /s/. The last two contained the uvular /q/ in place of /k/.

Interestingly, even in the above 6 words, 5 were rated above average iconicity in the Influenced by Arabic group. *He created* held a z-score of 0.18; though *He intended* was rated -1.20 in this group, the phoneme similarity being far-far and not a precise match (*He intended* → *araadha*).

The reason for the Influenced by Arabic group’s heightened perception of iconicity may be because the Arabic words themselves are also more familiar: they may have possibly encountered them before through cultural exposure such as general reading of the Qur'an, and in their own languages with more phoneme overlap than English. This being said, even in the

²⁶ Technically, English does contain this phoneme, such as in the word *then*, as well as phonemes that are close to this, such as in the /d/ in *dog*, or the voiced dental fricative /ð/ in *that*. However, in English, the voiced dental-alveolar is not considered a variant or allophone of /d/, such as in the word *intended*.

control group we do not see any particularly low iconicity scores, relatively speaking. Word 26 was rated -0.19 which is not that far off the mean, and the vast majority of the 32 words listed above did fit the hypothesis.

The PSF can not determine what the *most* iconic words will be. Clearly not all of the most highly rated words contained matching phonemes with English, thus they were perceived iconic due to other variables. However, the PSF does appear to be an important factor in deeming a word at least somewhat iconic to non-native speakers through subconscious comparison, and this is what we see in 28 out of 32 such words being rated above the mean (and in one group, all of the 'PSF words'). It is in the extreme ends of the rating bell curve (see Fendler & Muzaffar, 2008; also known as the Gaussian Curve, see Winter 2019b) where the most remarkable phenomena occur (Fendler & Muzaffar, 2008), such as in the top 10 words. Presumably, in this instance there will be other factors that play a greater role in determining perceived iconicity than simply PSF (though see 4.2.1 for a comparison with Experiment Two).

Of course, correlation does not imply causation (Aldrich, 1995). And without a deeper, thorough statistical analysis we will not know for sure the extent to which PSF can be described as an authentic factor or variable. Whilst this is outside of the scope of this piece, we find at least some preliminary evidence for PSF that can be assessed in future work into iconicity.

3.3 Experiment Two - Forced-choice Task

Experiment Two found that there was, on average, a 28.2% chance of accurately choosing a Qur'anic word when English-speaking American participants were presented with four choices from the 100-word stimuli pool. Out of the 100 words, 63 were chosen *at or above* chance rate, and 54 of the 100 were chosen at a rate *above* chance (see Appendix for detailed results). Of these 54 above-chance words, 17 were Adjectives, 13 Phonaesthemes, 10 Verbs, 8 Nouns and 6 Iconic words.

Thus, in the current forced-choice experiment, we find an Adjective / Phonaestheme / Verb / Noun / Iconic hierarchy. In comparison, the control group of English and European participants in the previous rating experiment showed an Iconic / Adjective / Phonaestheme / Noun / Verb hierarchy (compared and discussed later). *Table 7* below presents the percentage of each of the five categories chosen at a rate above chance across the initial 100-word stimuli list (twenty words per category).

Table 7 - Breakdown of the five categories of words chosen above chance rate

Category	Mean Choosing Accuracy (chance = 28.2%)	Percentage chosen above chance rate
Adjective	34.0%	85%
Phonaestheme	28.9%	65%
Verb	28.3%	50%
Noun	25.1%	40%
Iconic Words	25.1%	30%

3.3.1 Top 10 / Bottom 10

The top ten chosen words were:

- (1) the Adjective, *Noble (kareeym)* at 55% accuracy;
- (2) the Iconic Word, *He spread/expanded something (tahaahaa)* at 53%;
- (3) the Phonaestheme, *He suppresses them (yakbitahum)* at 52%;
- (4) the Verb, *He saw (ra-aaa)* at 48%;
- (5) the Verb, *He believed (aaamana)* at 46%;
- (6) the Adjective, *Little (in quantity) (qaleeyl)* at 44%;
- (7) the Adjective, *The Great ('azheeym)* at 44%;
- (8) the Iconic Word, *Tranquility (sakeeynah)* at 44%;
- (9) the Noun, *Command (amr)* at 42%;
- (10) the Adjective, *Constantly forgiving (gafoowr)* at 42%.

The eleventh and twelfth most accurate words also shared the same accuracy score of 42% with word number 10 (see Appendix for the full set of results). Previously, Section 3.2.6 presented the top 10 rated words across the three categories. From these, *Table 8* below presents the 3 words which were both *rated* very high in iconicity (top 10) and were *chosen* with high accuracy (top 10).

Table 8 - *The top 10 most accurately chosen words from Experiment Two which also appeared in the top 10 rated words in Experiment One*

<u>Exp. Two Top 10</u>	<u>Appearance in Exp. One Top 10 ratings</u>		
	Arabic	English	Influenced
He spread/expanded something	✘	☑	✘
The Great	☑	☑	☑
Tranquility	☑	✘	☑

These words were the Iconic Word, *tahaahaa* (*He spread/expanded something*), the Iconic Word, *sakeeynah* (*Tranquility*) and the Adjective, *azheeym*, (*The Great*).

Experiment Two also allowed a look into the incorrect words which were most commonly chosen instead of the correct target word. These will be discussed more in Chapter 4, in which there will be an analysis of participant choices in the bottom 10 accurately chosen words. The following words were chosen least accurately in Experiment Two and their most-chosen alternatives will be discussed later:

- (100) the Noun, *Sign* (*aaayah*) at 7% accuracy;
- (99) the Phonaestheme, *A Shaking* (*rajjaa*) at 9%;
- (98) the Iconic Word, *He dispersed* (*bath-tha*) at 12%;
- (97) the Iconic Word, *Path* (*siraath*) at 13%;
- (96) the Verb, *He came* (*jaa-a*) at 13%;
- (95) the Noun, *Other* (*ghayyr*) at 13%;
- (94) the Noun, *Way* (*sabeeyl*) at 13%;
- (93) the Phonaestheme, *Body* (*jasadan*) at 15%;
- (92) the Phonaestheme, *Stormy* (*'aasif*) at 15%;
- (91) the Phonaestheme, *They went out* (*kharajoow*), at 15% accuracy.

3.4 Comparing the Experiments

The next step was to triangulate and compare the results of Experiment One and Two for any possible correlation i.e., to see if the iconicity rating of a given word had any effect on choosing accuracy. Comparing the two sets of results across the entire 100-word stimuli, a Pearson's R test revealed a correlation of 0.28 in the English/European participant group ($p = 0.004$), 0.05 ($p = 0.56$) in the Arabic speaking group and 0.25 ($p = 0.01$) in the Influenced by Arabic group. Scatterplots are presented in *Figure 15* below. The y-axis represents data from Experiment Two only (based purely on accuracy results from English-speaking American participants); this remains a consistent point of comparison in all subsequent plots and figures.

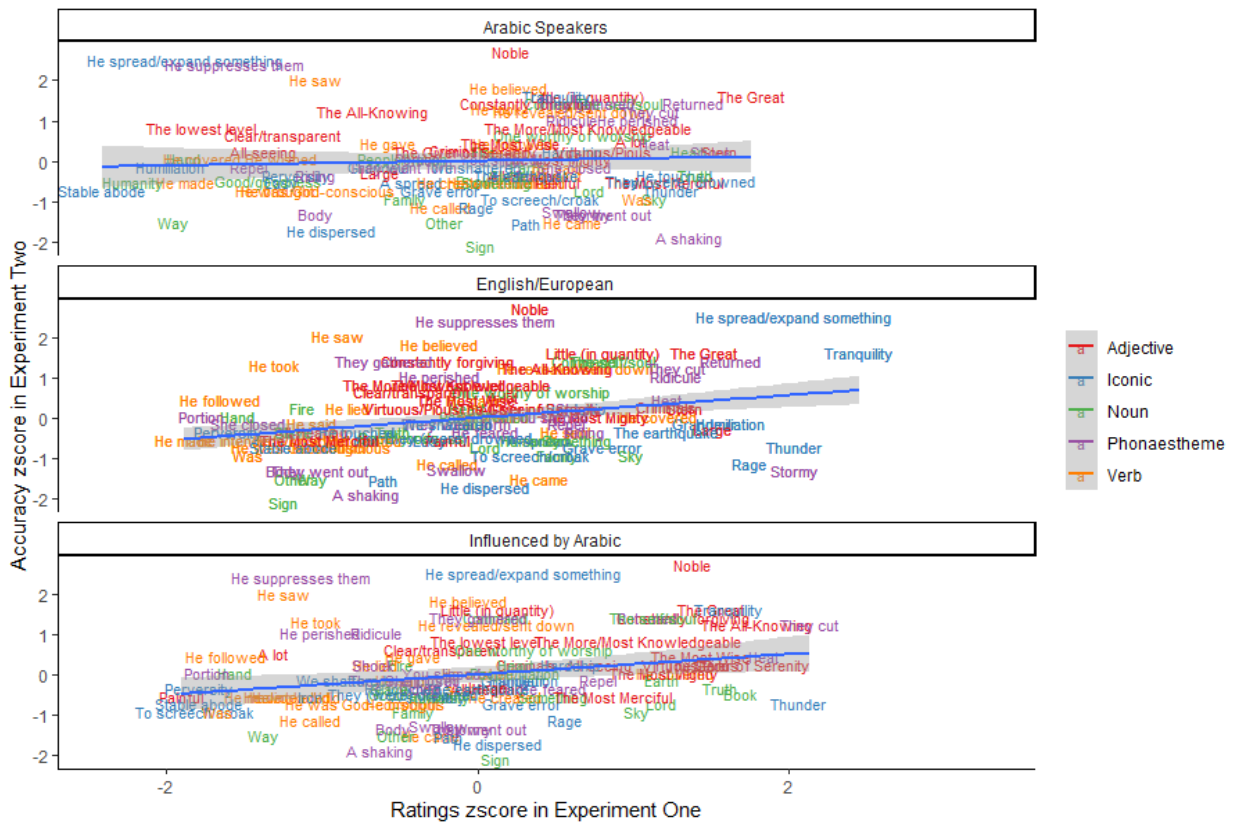


Figure 15 - Multifaceted correlations between Experiments (group ratings and choosing accuracy scores)

To provide a more of a clear direct comparison between ratings and choosing accuracy for the English/European group, *Figure 16* below compares the means z-score ratings of the five word categories in both experiments for the control group only (cf. *Figure 14* to compare with all groups). For instance, the orange bar represents Verbs; Verbs were rated extremely low in iconicity compared to the mean score, however in Experiment Two, they were chosen at a rate similar to, and slightly above the mean. Verbs were perceived as being extremely low in iconicity yet were chosen at close to the average rate.

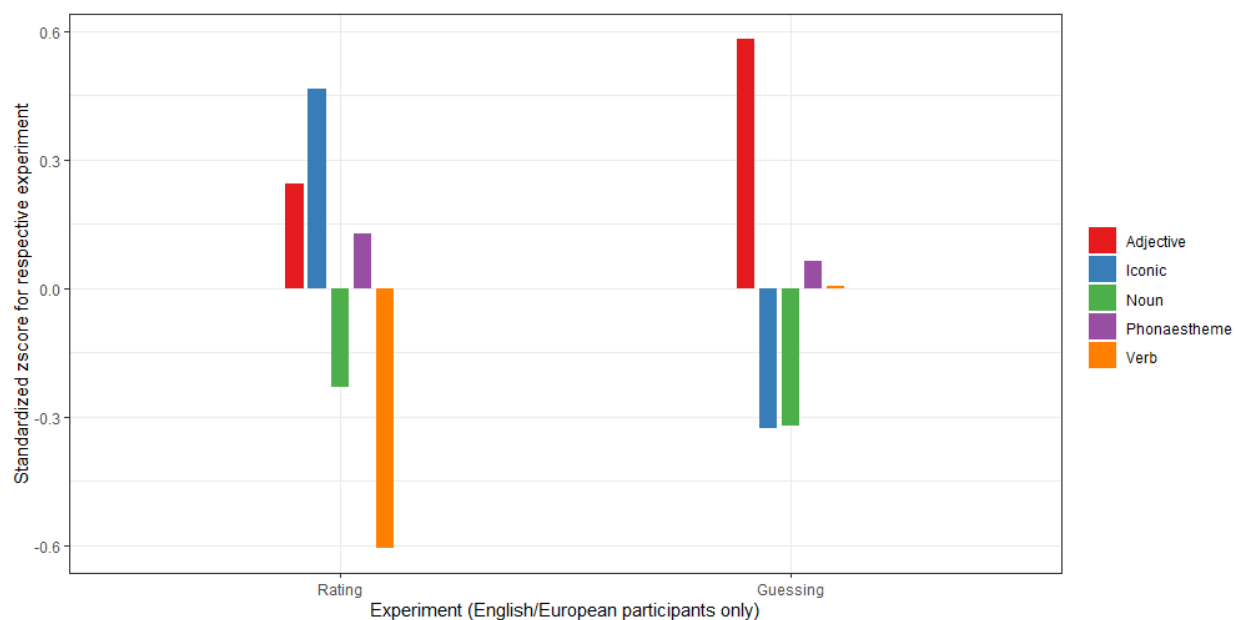


Figure 16 - Barplot of Experiment One (Rating) and Experiment Two (Forced-choice) in the English/European participant groups, comparing word category z-scores to means

Whilst the overall correlation between both experiments in this group was 0.28, the word categories show that there were in some cases stark differences between perceived iconicity of words and accuracy in choosing the meanings. This is most prominent in the Iconic word category. Compared to the ratings of the other two groups in Experiment One, Iconic Word forced-choice accuracy in English speaking participants was closest to Arabic Speaker perception of iconicity (z-score -0.2) and Adjective choices were closest to Influenced by Arabic speakers' perceptions (z-score 0.65). This results appeared to be the most notably similar set of results between the two experiments, and a Pearson's R test revealed a correlation of 0.36 ($p = 0.11$) between the ratings of the Influenced by Arabic participants (Experiment One) to the

accuracy of Adjective forced-choices in Experiment Two (see *Figure 17*). When running the same test with English speakers, we find a correlation of 0.28 ($p = 0.42$). Next, looking at the Nouns category, there was a 0.30 ($p = 0.20$) correlation between Arabic Speakers ratings of Nouns in Experiment One to the meaning choosing of Nouns by English speakers; and between English speakers in both experiments there was a correlation of 0.42 ($p = 0.06$).

This is discussed in the next chapter, but at this stage even, it appeared that perhaps the Influenced by Arabic speakers may have rated adjectives highly in the initial experiment due to coming across these words frequently in their lives, such as when reading the Qur'an for instance (though this would not explain why the other categories were not rated as high); to test this, a series of correlation tests were drawn between the frequencies of words in the Qur'an and ratings, as well as between frequency and meaning-choice.

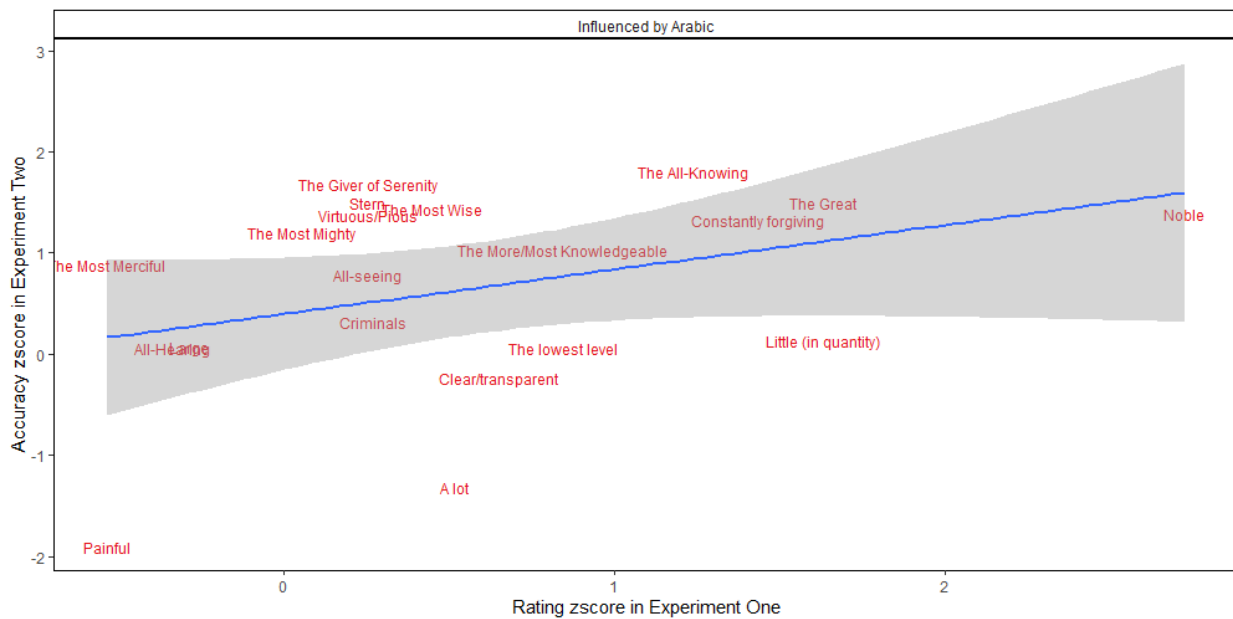


Figure 17 - Positive correlation of $r = 0.36$ between Experiment One Adjective ratings in the Influenced by Arabic group and the accuracy of English/European participants' Adjective meaning choice in Experiment Two

None of the results seemed particularly correlatory: in Experiment One, there was a negative correlation of -0.06 between general frequency in the Qur'an and ratings from the Influenced by Arabic group ($p = 0.50$), 0.05 for the Arabic Speakers ($p = 0.55$) and negative a score of -0.25 for

the English Speaking participants ($p = 0.01$). As word frequency in the Qur'an increased, the ratings of English/European participants decreased.

As for forced-choice accuracy, there was a negative -0.10 correlation between general word frequency in the Qur'an and meaning choices of words in Experiment Two ($p = 0.31$). Lastly, and specifically to test the hypothesis above, we ran a correlation test between the ratings of Adjectives in Influenced by Arabic participants and compared them to the frequency of those words occurring in the Qur'an. There was no correlation (0.01).

4.0 Discussion

The current chapter will firstly summarize the main takings from Experiment One and Two which will then be broken down and discussed in detail. Considering this is the most important section, multiple subchapters will break down and specialize in addressing all elements of the study.

Chapter 4.1 will analyze specifically the results of Experiment One, including Word Category rating scores in comparison to findings in other studies, along with a phonological analysis of the top 10 rated words and why they may have been rated as high as they were. There will also be a discussion on the different participant group variables and how linguistic context may have had a direct influence on word ratings.

Chapter 4.2 will analyze the results of Experiment Two, delving into why the results of the forced alternative choice task may not have correlated more with Experiment One; again there will be a deeper discussion of the top 10 words as well as the bottom 10 words in this forced-choice experiment.

Chapter 4.3 will look at the methodology utilised in the two experiments; there will be a discussion on the extent to which methodologies of iconicity measures are valid and useable, how well they transfer over to Arabic compared to native speakers, and the ways in which the methods used in the present two experiments may have been limited. The entire subchapter will address issues regarding measuring iconicity and to what degree it is valid as a construct. This will be interspersed throughout Chapter 4, but will be readdressed in particular detail in 4.3.

Chapter 4.4 will isolate the two categories of words which are distinct from the more conventional Adjective/Noun/Verb parts of speech—that is, namely, the Iconic Words and Phonaestheme categories: the results for these two sets of words will be examined and compared to previous literature, along with the previously cited initial studies by Bahaa-Eddin (2015) and Abdulsada (2019).

Chapter 4.5 will provide a brief review of how the findings of the current paper can at least in some small way add to the iconicity literature, along with the spheres of Arabic literature, and what the implications of the results as a whole may be applied to extended domains such as language learning. Lastly, 4.6 will consider future work—that which was not addressed, that which had to unfortunately be left out of the current paper, and how the present study may be taken further.

4.1 Exploring Experiment One

The main results from the rating experiment were that generally English speakers rated Qur'anic words as least iconic, followed by participants in the Influenced by Arabic group, followed by Arabic Speakers who rated the words taken from the Qur'an as most iconic.

Secondly, the following rankings shows the order of most iconic word categories as perceived by each group:

English/European Group:	Iconic > Adjective > Phonaestheme > Noun > Verb
Influenced By Arabic Group:	Adjective > Noun > Phonaestheme > Iconic > Verb
Arabic Speaking Group:	Phonaestheme > Adjective > Noun > Iconic > Verb

How these results fit in with previous studies will be discussed below.

4.1.1 General group differences

Based on the initial 1-7 rating scale results we see that the English-speaking participants considered the 100 words of the Qur'an to be least iconic with an average score of 3.17. This was then followed by those participants who spoke a language that had been influenced by, and thus contained many Arabic loanwords—with a mean rating of 4.03. Finally, the native Arabic-speaking participants rated the Qur'anic words as most iconic on average, $M = 4.75$.

There is a clear difference here that appears to stem from existing linguistic context. The English/European participant group, i.e., the group that rated words as least iconic, had nearly zero exposure to Arabic previously, based on the initial demographic surveys. Whilst English does contain Arabic loanwords (e.g., *mirror* from the Arabic *miraat*), no Arabic to English loanwords appeared in the 100-word stimuli list. This could play an important factor as what appeared to be happening, and this will be compounded to and elaborated upon later in this chapter, is that participants, particularly in the control group, would often compare the sound of the stimulus word to the sound of the translation given. As the stimuli words would rarely match the onset of the English equivalent, which was their only previous conceptualization of the signified concept (these participants were largely monolingual), this incongruence of form-form manifested itself in a perception of low iconicity. Support for this is found when comparing the

results of Pilot B and Experiment One (cf. Chapter 3). Though there was a correlation of 0.82 between both sets of results, the pilot data showed that participants were consistently aligning their iconicity scores with the level to which words ‘sounded like the English’ (this is a salient point to note and will be developed throughout this discussion into a theory called the Phoneme Similarity Framework). This was understood through debriefing the participants in attempts to better understand the motivation behind some of their choices: participants mentioned that if the word beginning sounded like the word beginning in English, they were more likely to rate this highly. This was not assessed systematically at the pilot level but was assessed thoroughly in the full experiment.

Form-meaning construal can not be considered in isolation, as human beings are made up of prior experiences and biases. Previous linguistic exposure to a sign will take foremost space in the mind of a participant as the ‘correct’ way of signifying a target word, and anything presented as an alternative will naturally seem different or alien. This theory will be further developed throughout the discussion.

The next group of participants to be considered are those participants who were bi- or multilingual, and whilst they spoke English primarily, they also spoke, at least somewhat fluently, their parents’ native tongues, such as Urdu or Gujarati. These are languages which in turn had at some point in the past had linguistic contact with Arabic, all of them being Indo-Aryan subsets.

This group had little to no *direct* knowledge of Classical Arabic words, for they identified their own Arabic proficiency as non-existent. By direct knowledge, what is meant is that although their languages had of course come into historical contact with Arabic, both due to geographic proximity and also cross-cultural interchange, the participants had not ever learnt or studied Arabic in and of itself.

The participants in this group may not have realised it but some of the words they were asked to rate also existed in some of their native tongues, such as *naar* (fire) in Urdu, stemming from Arabic, with a Qur'anic frequency of 145. Interestingly however, the average ratings were just as scattered and varied ($SD = 0.66$) as the English/European group (0.68). This is understandable as the L1 for both groups was still English (or a European language); the L2 however is where the difference lay. This group was not composed of first-generation immigrant Indo-Aryan speaking participants who had learnt English as their second language. This group was made up of British-born English speakers who *also* spoke their parents’ mother tongue.

This is in contrast to the Arab Speakers' iconicity ratings and variances. Firstly, insofar as raw iconicity ratings are concerned (standardization removes this difference between groups), the Arabic Speaking group presented a markedly higher overall iconicity score. The reasoning for this may be that unlike the other two groups, they are rating a word purely for the qualities it possesses, and not superimposing an English translation on to it as a point of comparison.

This claim aims to address the question why some words were rated as more iconic than others, regardless of lexical category, as well as why Arabic Speakers as a whole found Arabic words so much more iconic. The claim here is that not only for Experiment One, but for Experiment Two also: participants were not rating iconicity solely based off of what they heard from the stimulus in absence of other variables, but rather they were directly mapping the Arabic word to their understanding of the English sign they knew and were used to. This is a common theme and will be progressively built upon throughout the discussion; more concrete evidence will be provided in Chapter 4.1.3, but presuming the hypothesis holds water, let us consider Arabic Speakers' previous linguistic background compared to the other groups.

It is understandable that if Arabic is the primary mode of communication for a participant, then their whole lives would have been spent speaking Arabic and thus this would have primed them (Hoey, 2005:181; Hoey & O'Donnell, 2008; Traxler, 2011:85) for a heightened perception of sound-symbolism when asked to rate words in their mother tongue; this same point applies to studies with English speakers rating English words, Spanish speakers rating Spanish words, and Japanese speakers rating Japanese words. For Arabic Speakers, They do not have anything to compare a word to. They have only ever known the concept of *dog* to be signified by the word *kalb*; the idea of this concept, animal or word starting with a *d* sound as in *dog*, would naturally seem alien and foreign.

This may not be conscious or deliberate at all, but rather a genuine feeling of perceived iconicity. If all you have ever known for the idea of *book* is the word *kitaab*, then this label will not seem arbitrary. In fact, it will naturally seem quite apt (Reilly et al., 2017; Saussure, 1959; Waterman, 1956). This is why the same words can be rated highly by Arabic speakers yet low by English speakers, with Arabic speakers having entrenched Arabic form-meaning mappings over a much longer period of time than the other two groups (Wray 2005; also see Sidtis, 2012; Wray & Perkins, 2000). For the other two groups, they are not comparing words in isolation, in the absence of any bias, or from a 'blank slate'. They are comparing sounds to what they are used to and to what they have known their whole lives.

With this borne in mind, when analyzing the deviation of scores for Arabic Speakers, we find their perceptions of iconicity converged much closer the mean of their group, which is reflected in their *SD* scores: Arabic Speakers' *SD* = 0.48 as opposed to the 0.66 and 0.68 in both the Influenced by Arabic and English/European groups respectively. This could also mean that they judged all words as being more similar in their level of iconicity, and were less sensitive to differences in iconicity between words.

What is incredibly revealing is that the only words which had a normed rating average of 5.51 and above, were all rated such by Arabic speakers alone. Conversely, the only words which received an average of 2.5 and below, were all rated such by English/European participants only. In other words, when the ratings are compared to the spread, (comparing all the participants across the three groups) *all* of the (normed) 'highest' ratings were from the Arabic speaking group (and some from the Influenced by Arabic group) and *all* of the 'lowest' ratings were from the English/European group. Granted, there are certainly extreme values or outliers to be considered, and granted this is pre-standardization, but the role of previous linguistic bias is undoubtedly a measurably effective and important variable in ratings.

4.1.2 Word Category differences

All descriptions of hierarchies are qualitative and admittedly weakly grounded in the data pool, nonetheless from a descriptive point of view, we see the following orders:

English/European Group:	Iconic > Adjective > Phonaestheme > Noun > Verb
Influenced By Arabic Group:	Adjective > Noun > Phonaestheme > Iconic > Verb
Arabic Speaking Group:	Phonaestheme > Adjective > Noun > Iconic > Verb

For the purpose of fluidity, and because they will be analyzed later in Chapter 4.3 in great detail, the discussion on Phonaesthemes and Iconic Words will be briefly omitted: they do not categorise into a typical grammatical part of speech as do the other three categories, their comprising stimuli were not chosen from the same pool or with the same criteria used for the other three (based off of frequency in the Qur'an as seen on corpus.quran.com, as opposed to previous studies on Arabic Words) and thus they are not comparable to other work into iconicity POS, which will be a primary discussion point in the present subchapter.

Excluding Phonaesthemes and Iconic Words, we see each group presenting a consistent **Adjective** > **Noun** > **Verb** rating hierarchy.

Perry et al. (2015) conducted a similar study with English speaking participants rating English words for iconicity. Their study presented an Adjective > Verb > Noun hierarchy. This was expanded upon by Winter et al. (2017a), a study in which native English speakers rated 3001 words, presenting a Verb > Adjective > Noun ranking. In all of these instances, we find Adjectives being rated higher than Nouns, however in the present study, Verbs were rated lowest (even by native Arabic speakers), whilst in Perry et al. (2015) they are rated between Adjectives and Nouns, and in Winter et al. (2017a) they are the highest in iconicity. The current paper therefore replicates the Adjective > Noun findings of these two studies, but does not match either of them in regards to Verb rating. In fact, all three studies differ in regards to perceived Verb rating, but the question of why remains.

Obviously, Arabic is a different language to English—that being the greatest difference—though this does not explain the POS hierarchy difference between the two studies highlighted above. A deeper look at both the presentation of stimuli as well as language composition may point to clearer answers.

Verbs may be more varied in their ratings due to different presentations of the verb stimulus to participants in different studies. In Perry et al. (2015), verbs were presented in what appears to be the infinitive (*Figure 1* in their paper shows an example of the verbs used: *Stop*). In contrast, the current paper presented nearly all verbs in their base Arabic form: third person singular masculine e.g., *qaala, he said* (though see Chapter 2.1.2 for exceptions). Consistency across studies would be ideal in this regard, though consideration must always be made to the language in question, and what the base form is for said language (as was the reasoning in the present study).

Such procedural differences may be one variable leading to ranking differences across studies, though other factors will undoubtedly have played a part. It must be noted, though discussed in detail later, in the forced-choice experiment, we see English speakers accurately choosing meanings of Arabic words in an Adjective > Verb > Noun hierarchy, similar to the iconicity rating hierarchy results of Perry et al. (2015).

Perry et al. (2015) also conducted iconicity rating tests with native *Spanish* speakers rating Spanish words in their study. They found an Adjective > Noun > Verb hierarchy. The primary reason for this is thought to be because Spanish is a verb-framed language.

Comparing all these studies and ‘sub-experiments’ then, Adjectives are consistently found to be most iconic, and Verbs more varied. As mentioned previously, typologically, there is a difference between languages such as English and Spanish. English encodes the motion of a verb’s meaning within the word itself, whilst Spanish encodes this in a separate word (Beavers et al., 2010; also cf. Chapter 1.1). Arabic is like English in that the verbs encode primary motion meanings and do not rely on external adverbs in the sentence (Alhamdan et al., 2018), in the way Spanish does. However we still find the Adjective > Noun > Verb hierarchy across all three groups of raters in Experiment One of the present study; the argument may be made that only native speaker judgements give the most transparent ratings (Winter, 2019a), but this result is also found in the Arabic Speaking group. The hierarchy found in Arabic ratings matches the Perry et al. (2015) findings in Spanish. In Arabic, verbs can both be verbs of manner and verbs of path (Ameka & Essegbey, 2013) and so Arabic can both be typologically a verb-framed language as well as satellite-framed, depending on the sentence in question (Alhamdan et al., 2018; Saidi, 2007; Maalej, 2011).

The current study has primarily been reported with mean values. Based on this, it must be noted that the mean results of these three POS categories are much closer to each other in z-score for the Arabic Speakers than the other two groups. In other words, there is not a great

disparity in the perception of iconicity for the Arabic Speakers between these three grammatical categories.

Although means are most comparable to other work, there was an additional finding when comparing categories by *median* scores. In this, verbs are in fact rated higher than nouns, creating an Adjective > Verb > Noun ranking (matching the findings of Perry et al. (2015) in English). The English/European and Influenced by Arabic groups present the same Adjective > Noun > Verb ranking upon comparison of median scores.

Thus, when isolating native speaker judgements, we find that Arabic Speakers rate Arabic words in a manner that corresponds to the native English Speaker judgements in Perry et al. (2015), and considering the difference between POS was only marginal at times, they are also comparable to the Winter et al. (2017a) findings in English; Perlman et al. (2018) combines the ratings of different studies by z-score and found that English speakers in fact presented an Adjective > Verb > Noun hierarchy, again corresponding with the hierarchy by median of the present study in Arabic.

The question of why these relatively consistent hierarchies exist is one that has been discussed in a few iconicity rating works (e.g., see Perry et al., 2015; Perlman et al., 2018), and though the patterns discussed thus far are qualitative and admittedly weakly grounded, there are a number of theories that when considered holistically may provide explanation to the recurring patterns seen.

Adjectives are consistently rated highly; Dingemanse et al. (2015) mentions that meanings related to size, intensity, temporal unfolding, and repetition may naturally lend themselves to iconicity—whilst ideophones may be the archetypal examples of these meanings, when solely considering grammatical categories, these are generally the meanings represented more so by adjectives. By comparison, nouns and verbs may attempt to signify ‘abstract concepts’ which are difficult for languages to represent with iconic forms (ibid.). Depending on the abstract nature of the noun and verb stimuli set used in experiments, the findings may provide more or less ‘iconic’ for nouns and verbs, but remain comparatively consistent (that is to say, *high*) for adjectives.

Returning back to the current study, we will now unpack and develop an understanding of the three groups’ perception of iconicity for Adjectives, Nouns and Verbs. Although the hierarchy of POS iconicity is consistent across the three groups (mean), there is a difference between the groups insofar as how iconic each group perceived the POS categories, relative to

their overall 100-word average. This can be seen when considering the standardized ratings of Experiment One (cf. *Figure 14*).

The Influenced by Arabic group rated Adjectives as most high. This may be because participants in this category may have simply encountered Arabic adjectives most frequently in their lives if/when when reading the Qur'an (many speakers of such languages are culturally Muslim due to Arab influence, see Papaconstantinou, 2007; Shouby, 2012) or even speaking their own language at home (many loanwords from Classical Arabic having made their way into Indo-Aryan languages; Jain & Cardona, 2007; Bryant & Patton, 2004). Yet the frequency tests proved otherwise: there was no correlation between Qur'anic frequency of words and higher iconicity score in the multiple tests run, however this only looked at how often those particular words appeared in the *Qur'an*—not the language of the participant—which may in fact use that word quite frequently in day-to-day speech. For instance, the noun *naar* in Urdu means *fire*, even of the most quotidian kind e.g., a fire in a fireplace. Naturally, one who speaks Urdu would use this word regularly in their life as it is a common word and concept. *Naar* means fire in Arabic also, but, in the Qur'an, refers to the Hellfire, which is a more specific and restricted meaning than the superordinate (Ashcraft, 1978; Fillmore et al., 2012; White, 1982) day-to-day usage of the word *fire*. Hence, such a correlation test may not be particularly revealing (also results showed the average *naar* rating for Urdu speaking participants was 3.30, below the group average of 4.03).

The frequency of a word in the Qur'an may not necessarily paint a picture of the frequency of that word in other languages that contain said word. Such participants may therefore be more accustomed to these words more or less than the Qur'anic frequency suggests. This is positively seen by the slightly higher rating z-scores Influenced by Arabic speakers present in the Adjective and Noun categories (compared to the English/European participants), though the Verb category is similar to findings of English Speakers.

Nouns and Adjectives trickle into foreign languages becoming loanwords more frequently than Verbs (Tadmor, 2009) which are loaded with conjugational 'baggage' and do not typically transfer smoothly across geo-linguistic space the same way a simple noun does.

The last discussion point is one final reason why Adjectives were rated relatively high, and Verbs relatively low. This is found in both the current study and Perry et al. (2015). In the present study, many of the Adjectives had similar templatic constructions. Adjectives in Arabic conjugate into set morphological patterns (Holes, 2004), with the *fa'eeyl* pattern being the primary construction for adjectives. Adjectives will typically contain in the first syllable the

nucleus *-a-* and the word will end with the syllable *-eey_*, such as *kareeym* (*Noble*), *raheeym* (*The Most Merciful*), *hakeeym* (*The Most Wise*).

When considering the stimuli set, it may be argued that the 20 verbs remained morphologically consistent in third-person singular masculine (e.g., *He called*, *He created*, *He gave*). Whilst the *translations* may seem similar in the Verbs, the Arabic *morphology* does not present clear conjugation consistency (*He called* in Arabic is *dha'aaa*, *He created* is *khalaqa*, *He gave* is *aaaatha*), nor as much morphological similarity as Arabic Adjectives (*kareeym*, *raheeym*, *hakeeym*). Verbs on the other hand show no such recurring sounds or features. Just as Dingemanse (2012) states that ideophones often present with reduplication, and phonaesthemes share the onset, adjectives in Arabic often share the same templatic morphology. Thus any potential iconic forms, or rather systematicity (Dingemanse et al., 2015), are 'watered down', not as clear in the English translation and not as clear in the Arabic morphology, relative to other POS such as Adjectives. The implications of this observed systematicity and its correlation with perceived iconic forms will be discussed later.

4.1.3 Iconic Words and Phonaesthemes in Experiment One

This section will concentrate on the word categories ‘Iconic Words’ and ‘Phonaesthemes’ in Experiment One specifically. Firstly, an important reminder: these two categories of words are not attested in the Qur'an, Classical Arabic or MSA, in that they are not POS categories. They were chosen by-hand (see Chapter 2), though stemming from two studies into Arabic ‘ideophones’ (Bahaa-Eddin, 2015) and phonaesthemes (Abdulsada, 2019). Also, these two groups of words are composed *of* adjectives, verbs and nouns. Comparing them to these three would thus be invalid because of POS overlap. And whilst they are not directly comparable to the grammatical categories of Adjective, Noun and Verb, there was no overlap in specific words between any of the five categories.

Overall, iconic words and phonaesthemes were rated moderately high in iconicity. In the current study, the following trends can be seen: Iconic Words were the highest rated Word Category of all five for the English/European group. Phonaesthemes were the highest rated category for the Arabic Speakers. Iconic Words and Phonaesthemes were rated higher than Verbs in all three groups. Similar findings with Japanese ideophones, though more pronounced, can be found in Thompson et al. (2020); also see Kwon (2017) in regards to similar findings in English Phonaesthemes.

Inter-group patterns show the whilst Iconic Words were rated highest by English/European participants, followed by Influenced by Arabic participants followed by Arabic Speakers, in the *Phonaestheme* category, the order was Arabic Speakers, followed by English/European participants, followed by Influenced by Arabic participants. This is the only category to show such an order in the participant group, except for the Verb category which also exhibits this hierarchy. Phonaesthemes and Verbs appeared relatively most ‘iconic’ for the Arab Speakers. Upon comparison of the Phonaestheme and Verb category, we find that 11 of the 20 Phonaesthemes were words which could be classified as verbs in traditional grammar, which may explain the correlation seen between these two categories.

There is no one definitive explanation as to why English/European participants rated Iconic Words most high and why the other two groups did not. One explanation for the perceived iconicity ratings may be due to the somewhat onomatopoeic words that seemingly create more of an impression on English speakers than the other groups (e.g., *ar-raifah* may sound like an earthquake to English speakers more so than others; *ughriqu* presenting the

sound of drowning; *ar-ra'd* for the sound of thunder), though this does not explain the marked difference between the three groups for this category. Comparison with Experiment Two however shows that this perception of sound-symbolism was different to the guessing accuracy for Iconic Words, which were in fact the least accurate of all five groups (see Chapter 4.2).

Experiment One opens some doors into iconicity questioning, namely the extent to which iconicity rating tasks are valid and in fact measuring what they are set out to measure. Certainly, they are more applicable perhaps with native speaker ratings (Winter, 2019a) for non-native speakers appear to have clear external factors and possibly less overt factors influencing the decision-making process. Comparable data through separate methods of experimentation allows us to test this. This is where Experiment Two aimed to 'fill in the gaps' and provide triangulation or comparison data, basing results on accuracy of meaning-choices instead of ratings.

4.2 Exploring Experiment Two

The results of the forced-choice task were particularly interesting because they were the measurements of a different kind of iconicity test, that is, the forced-choice design. Of the twenty Adjectives used in the stimuli-pool, 85% were chosen at a rate above chance (with the average word being chosen at a 28.2% accuracy rate when given four choices). This was followed by Phonaesthemes at 65%, Verbs at 50%, Nouns at 40% and Iconic Words at 30%. This Adjective > Phonaestheme > Verb > Noun > Iconic Word hierarchy is not entirely comparable to any of the three rating hierarchies found in Experiment One, even when removing Phonaesthemes and Iconic Words.

Verbs, which were consistently rated 'lowest' in iconicity in the rating task, were in fact chosen for meanings more accurately than Nouns, and had a slightly above-average forced-choice mean. Adjectives in the English participant group had a rating z-score of 0.29 but a force-choice z-score of almost 0.6 by the same group (Mean Choosing Accuracy = 34% whereas chance was 28.2%). I had not hypothesised just how iconic Adjectives would actually be when it came to their forced-choice accuracy. In fact, the most accurately chosen word, *Noble (kareeym)* is an Adjective with 55% forced-choice accuracy when given four choices. Adjectives are not only perceived as highly iconic, but chosen for meaning at a rate that greatly exceeds chance. This could be due to the templatic adjective structure Arabic utilises, but also more broadly because Adjectives as a category appear in many studies predisposed to iconic interpretation.

Perry et al. (2015)'s study presented an Adjective > Verb > Noun hierarchy, which matches the forced-choice hierarchy in the current Experiment, though the experimental method differs between the two (forced-choice/rating), the dependent variables match. Comparatively, the same study on Spanish words presented an Adjective > Noun > Verb hierarchy. English and Arabic not being verb-framed languages like Spanish, the hypothesis was that Verbs would present a higher iconicity measure than Nouns. Whilst this was not found to be the case in Experiment One, Experiment Two confirms this hypothesis.

Experiment One and Two illustrate the difference between what participants perceive to be iconic through their own self-chosen ratings, and what accuracy data reveals about potentially iconic variables in word-signification and closed guessing processes. This may raise concerns regarding the validity of certain measures. Compounded to the above is the fact that when correlating the two Experiments, a slope greater than 0.28 (in the English/European

participants group) is not found. This can be attributed to a number of reasons. Firstly, we have noted that a salient driving factor, knowingly or not, for the ratings of participants was the existence of phoneme similarity matches. 28 of the 32 PS words were rated above average in Experiment One. In Experiment Two, of these 32 words, only 17 were accurately guessed above average. The factors of PSF do not seem to have as profound an effect in Experiment Two (though, of course, over 50% of the PSF words were guessed above chance, indicating some possibility of PSF). Of the 5 PS words rated below average in Experiment One, 4 were guessed at a rate above chance in Experiment Two.

Participants' *perception* of iconicity i.e., as rated by them thus seems to be primarily motivated, consciously or subconsciously by the PSF, whereas guessing accuracy appears to be down to less overt similarities between the two languages. The top 10 words and the bottom 10 words 'accurately' guessed however show a slightly different picture.

4.2.1 Top 10 words and PSF

Of the top 10 accurately guessed words, 6/10 can be considered words with matching phonemes. These have been highlighted green.

- (1) the Adjective, *Noble (kareeym)* at 55% accuracy;
- (2) the Iconic Word, *He spread/expanded something (tahaahaa)* at 53%;
- (3) the Phonaestheme, *He suppresses them (yakbitahum)* at 52%;
- (4) the Verb, *He saw (ra-aaa)*²⁷ at 48%;
- (5) the Verb, *He believed (aaamana)* at 46%;
- (6) the Adjective, *Little (in quantity) (qaleeyl)* at 44%;
- (7) the Adjective, *The Great (azheeym)* at 44%;
- (8) the Iconic Word, *Tranquility (sakeeynah)* at 44%;
- (9) the Noun, *Command (amr)* at 42%;
- (10) the Adjective, *Constantly forgiving (gafoowr)* at 42%.

The top 10 guessed words being comprised of 60% ‘PSF words’ could of course be down to chance, as overlap in phonemes between words in two languages is inevitable—however there were only 32/100 PSF words in the entire stimuli-pool. Of these 32, 17 were still relatively iconic by the measures used in Experiment Two, in that they were guessed at a rate above chance. Also though only 32/100 from the overall stimuli are PSF words, in Experiment Two, 6/10 of the top-10 words are PSF words (and 6/10 in Experiment One), instead of 3 or 4/10 expected.

This prevalence cannot therefore be placed purely down to chance, but rather indicates that phonemic similarities still exert some measurable, if lessened, effect in forced-choice tasks to what has been found in the rating study. Interestingly, it is at the tail end of the iconicity distribution in this Experiment that the effect is still seen to be nearly as powerful as the tail end of iconicity distribution in Experiment One (i.e., in the top 10 most iconic words), meaning the PSF is still measurably effective in determining the relatively *more* iconic words in a forced-choice task, but is not be as effective *across* the breadth of PSF criteria-matching words (where we see a heightened average effect across PSF words, such as when tasks rely on participant ratings).

²⁷ The Arabic phonemes present are /ʌ/ and an elongated /æ:/ as opposed to the /ɔ:/ in *saw*.

Of the top 10 words in this Experiment, the remaining 4/10 (numbers 1, 2, 4, and 5 *kareeym*, *Tahaahaa*, *ra-aaa*, *aaamana* respectively) must be attributed to isolated ‘sound-symbolic’ features, separate to the PSF, which will be described below.

In *kareeym* (*Noble*), we find the adjective templatic pattern as well as the elongated /i:/ which may provide a ‘smooth’, ‘sophisticated’ sound. The word then ends in the phoneme /m/, a sonorant consonant which has been found to be associated with concepts of curviness as opposed to jaggedness (Nielsen and Rendall, 2011). Such an association may be extended to positive meanings in general, with *nobility* being a highly respectable and positive quality trait.

In *Tahaahaa* (word 2), the word signifies spreading or expanding. This may be thought of as a manual action, and manual actions have been found to score high in iconicity (Perlman et al., 2018). The construction of the Arabic is also one where the elongated /a:/ vowel is reduplicated, a feature common in ideophones (Samarin, 1965) which are typically rated higher in iconicity (Dingemanse et al., 2012).

Amongst other features, English verbs are recognized by approximants such as /r/ in the first syllable (Dingemanse et al., 2015). This may have played a factor when participants understood the translation and POS of *ra-aaa* was that of a verb: *He saw*—and of course, this may have been at a subconscious level.

Word 5, *aaamana* (*He believed*), is constructed with the open front vowel (/a/) and nasals. Fónagy (1961) found that /m/ tended to occur in more ‘tender’ poetry and less in aggressive poetry. This word, which is a verb representing belief, may be attributed to a tender, positive feeling or emotion akin to believing in something. Perlman et al., (2018) also found feelings and emotions in general rated highly in iconicity in English Speakers leading to *aaamana* being interpreted as a positive, tender feeling word.

Lastly, though the word ‘*Azheeym* (*The Great*) is already attributed to PSF, the phonemes are not a perfect match. It contains a voiced pharyngeal approximant (/ðʕ/) which is not found in English. However, the closest phoneme, the voiced dental fricative /ð/, has been found to associate with concepts of largeness (Monaghan & Fletcher, 2019), as have nasals (/m/) in concepts of largeness (Imai and Kita, 2014).

Next we will discuss not why participants chose the correct target word in the top 10 answers, but why they may have chosen certain incorrect answers in the same experiment.

4.2.3 PSF explored through the bottom-10 words

Experiment Two allowed for the different choices made by participants to be analyzed in detail; participants were given four options, such as if presented with the word *rabb*, they may be given the options (1) Fire (2) Lord (3) He covered (4) Criminals. The target word (*Lord* in this case) always remained as one of the options for participants, but the three incorrect words were randomly assigned from a pool of nine words randomly assigned from the 100-word stimuli (see Method). The following words were guessed least accurately in Experiment Two:

- (100) the Noun, *Sign (aaayah)* at 7% accuracy;
- (99) the Phonaestheme, *A Shaking (rajjaa)* at 9%;
- (98) the Iconic Word, *He dispersed (bath-tha)* at 12%;
- (97) the Iconic Word, *Path (siraath)* at 13%;
- (96) the Verb, *He came (jaa-a)* at 13%;
- (95) the Noun, *Other (ghayyr)* at 13%;
- (94) the Noun, *Way (sabeeyl)* at 13%;
- (93) the Phonaestheme, *Body (jasadan)* at 15%;
- (92) the Phonaestheme, *Stormy ('aasif)* at 15%;
- (91) the Phonaestheme, *They went out (kharajoow)*, at 15% accuracy.

For *aaayah*, the three most common translations chosen were *He created*, *The Most Wise* and *Constantly Forgiving*. Though they did not appear as options for every participant, collectively, the guesses for these three options alone accounted for 55% of choices made. So why were they chosen so often instead of the correct meaning? A possible reason for this may be due to the multi-word translations in each of these options. The audio stimulus of *aaayah* is broken down to *aaa + yah* which is polysyllabic, but more importantly, sounds like two separate words when said aloud or heard by a participant. Perhaps the most chosen options tapped into this construct, reflecting the multiple syllable ‘similarity’, whereas the monosyllabic correct target *Sign* did not.

For *rajjaa*, the most common choice was *hardship*. The PSF may play a factor here, in that this option shares the /r/ phoneme and contains a similar postalveolar, albeit a voiceless

fricative instead of the voiced affricate. Additionally, the order of these ‘similar’ phonemes is also the same (/r/ then the postalveolar), whereas in the target translation, the postalveolar appears toward the beginning of the construction.

For *bath-tha*, the most common (incorrect) three choices were *family*, *book* and *heat*. *Book* may have been chosen due to the close-close PSF in both words. An admittedly more speculative assumption for choosing *heat* may be that *bath-tha* contains the voiceless dental non-sibilant fricative /θ/ which may provide an iconic resemblance with the sound of sizzling.

For *siraat*, the most common two choices, *You slipping* and *To spread/expand something* both match the criteria of PSF, whereas the third most common choice, the correct translation *path*, did not. A similar case was the case for *jaa-a*.

The word *ghayyr* may sound relatively ‘harsh’ due to the three voiced phonemes, which have been associated to concepts of largeness and masculinity (Klink & Wu, 2013); the two most common choices were similarly ‘harsh’ words in terms of signifying the concepts of *iron* and *shaking*.

Sabeeyl was most commonly matched to the meanings of *clear/transparent* and *tranquility* followed by the target translation, *way*. The word *sabeeyl* is phonotactically similar to *sakeeynah* which was highly associated with the meaning of *tranquility*, thus there may be a stronger relationship with tranquility due to the the sibilant /s/ and elongated /i:/ (see Mongahan and Fletcher, 2019). The Arabic word for *clear/transparent* is also *mubeeyn*, which, interestingly, is constructed similar to *sabeeyl* and was guessed at above-chance rate.

For *jasadan*, the most commonly matched meaning was *they went forth* followed by the target, *body*. This may be because both of these contain three syllables, reflecting a similarity in association across languages, whereas the target is comprised of two syllables.

The word ‘*aasif*’ contains the harsh voiced pharyngeal approximant, which may be associated with concepts of masculinity due to its ‘harsh-sounding’, foreign articulation point, but also due to voicing (Klink & Athaide, 2012). This may aptly ‘match’ with the most common choice, *He intended* due to the overt semantic masculine gender of the verb.

The word *kharajoow*, whilst a Phonaestheme, is also in traditional grammar, a verb. The two other most common associations were the verbs *he followed* and *they went forth*. Three of the other most chosen options were also verbs. Whilst the pool of options was randomized, this overlap in all options coincidentally being verbs may have led to some conflation in testing iconicity and thus affected accuracy.

Thus far, Chapter 4.1 and 4.2 have discussed the broad findings and lessons from Experiment One and Two. Now, we will bring together the points mentioned above to consider iconicity more generally: how the current study can possibly inform our understanding of methodology and experimental design, as well as best practices in iconicity testing.

4.3 Measuring Iconicity: Evaluating the current methodology and the construct validity of measures across the field

As we have seen, the rating and forced-choice tasks have provided different, yet fascinating results. It may be argued that both experiments in fact measure different things: this can be seen in the results which are not as correlatory as may have been initially hypothesised. Perhaps the reason why the correlation between both studies was indeed lower than expected is because of the methodology used; naturally, this brings rise to questioning the extent to which differing experimental methods tap into the construct that is iconicity (Motamedia, 2019; Winter & Perlman, in press). Such will be the exploration of the current subchapter, considering the stimuli, method and construct validity of the current study, with consistent reference to other works in the field of sound-symbolism. This will conclude with a combination of criticisms and limitations of the current study and what could have been improved.

4.3.1 Participant and Stimuli variables

Kahneman (2011:66) in his book *Thinking, Fast and Slow*, writes about what he coins the Exposure Effect (adapted from *the Mere Exposure Effect*, Zajonc, 1968) in which the target stimulus is thought to be made just accessible to the individual's perception and repeated exposures under these conditions result in enhanced liking for a neutral stimulus (also see Fang et al., 2007 and Bornstein & Craver-Lemley, 2016 for a detailed review). Across all parts of language, Kahneman argues that repetition of any given word induces cognitive ease and a 'comforting feeling of familiarity' compared to being presented with unpronounceable, foreign or strange sounding words. Even the repetition of an arbitrary stimulus has been linked with mild affection (Zajonc, 2001). It is not unreasonable to presume that when presented with words that are outside of one's linguistic context (see Perniss & Vigliocco, 2014), perceptions of 'low iconicity' may be conflated with the absence of exposure (and thus, familiarity and affection) subsequently leading to lower results compared to native speakers. Corroborating this, previous studies have found that iconic qualities of phonemes and words appear to be learned in a certain linguistic context, i.e., within that language community, and cannot necessarily be extended to

another (Taylor & Taylor, 1965) and that whilst some aspects of sound symbolism are universal (e.g., see Iwasaki et al., 2007), others are language-specific (Imai & Kita, 2014).

Of course one's linguistic context is a complex, intricate matter: a unique blend of culture and history. It is ultimately the most variable of individual differences that cannot be detached from participants under laboratory conditions. However this variable must be borne in mind when designing experiments, with some iconicity-testing experimental designs being more favourable in choice for testing native speakers and others perhaps for non-natives. The pros and cons for both will be considered throughout this subchapter with continuous reference to the choices made in the current study.

The stimuli utilised in the current study aimed to create a thoroughly data-driven approach, representing the most common words in the Qur'an for that category of words. As words were chosen by frequency of occurrence, this created a pool of 100 frequently occurring words across three major POS categories. Representative of the vast majority of the Qur'anic vocabulary as they were (cf. Chapter 2; also see Read & Nation, 2004), one issue that may be highlighted is that the stimuli may not have been representative of *traditionally iconic* lexical fields (see Motamedi, 2019). For instance, in all of the 100 words, even in the two less conventional categories of Iconic Words and Phonaesthemes, there were no colour words (e.g., as explored in Perlman, 2018). There were no sensory referents (e.g., see Winter et al., 2017a). There were no mentions of flora or fauna (e.g., see Callebaut, 1985; Hunn, 1977). Lupyan and Winter (2018) found that iconicity ratings, at least in English, are negatively correlated with contextual diversity: words with high iconicity ratings appear in fewer text types, suggesting their meanings are restricted to a narrower range of contexts (Lupyan & Winter, 2018). In other words, although the Iconic Words and Phonaesthemes aimed to capture some of the more iconic, less common words, the domains where iconic mappings may be expected and have been found in other literature were almost altogether skirted.

On the other hand, we find some studies using a less data-driven and more selective approach (e.g., see Joo, 2018 as cited in Motamedi et al., 2019) finding a proportionally higher number of associations across unrelated languages. Based off of this, more modern insights in iconicity research suggest that instead of analyzing 'the largest datasets, blind to the relationships you expect to find' (Motamedia, 2019), it can be suggested to focus on meaning domains for which we expect iconic mappings. Perhaps better yet would be an eclectic or holistic approach, one that combines the breadth of a large dataset of common words, as well as the depth of the more typically attested iconic domain sets within languages.

Another variable to consider when evaluating the construct validity of iconicity measurements is the presentation itself. When looking at the presentation of the chosen stimuli in the present study, the options were to present the translation and provide a transliteration, or provide an audio clip, or both. Transliterations were avoided as this may have created unwanted confounds in comparing the English orthography to the transliteration. Auditory representations were deemed optimal as they allowed for a natural hearing of the stimulus with phonemes correctly articulated by a fluent Arabic speaker. This was particularly important for studying possible iconic qualities; studies suggest that articulation plays a role in establishing the form-meaning relationship of iconic words such as ideophones (e.g., see Oda, 2000), elements such as prosodic foregrounding and iconic gestures all contributing the performative semiotic package as a whole (Dingemanse et al., 2016).

The present study employed audio clips from *Quran.com*, all from the same reciter who had no knowledge that the clips would in future be used for such experimentation; this was thought to hopefully mitigate any demand characteristics such as with a hired reciter, who might instead be given the task of pronouncing the stimuli for a particular task and in their attempts to ‘do a good job’, over-pronounce or articulate words in a less natural manner.

However, considering this retrospectively, whilst using pre-existing recordings allowed for uniformity and consistency in recitation across all the words used, the question remains if it was necessarily the best. To accurately measure iconicity, care needs to be paid to ensure stimuli sound as natural as possible. Stress, prosody and intonation all play a factor in the perception of iconicity (Alpher, 2001; Imai & Kita, 2014; Lockwood & Dingemanse, 2015) and studies have found that prosodic implementation and phonological systematicity at the prosodic level appear just as important as segmental information in supporting iconic interpretations (Dingemanse et al., 2016; Kuniyama, 1971; Thompson, 2018). Words are inherently contextual building blocks, largely meaningless in isolation; when these are removed by pronouncing words in absence of any other words or surrounding context, this could strip away many of the factors that demarcate iconicity (Thompson, 2018).

In subsequent studies of iconicity, one way around this may be to hire a speaker to pronounce words in the context of a sentence, without informing them of the precise *word being studied*, and thereafter extracting the audio clips of word(s) required, recited naturally in context, from the larger recitation. The primary consideration here would be ensuring that all words be articulated clearly as they would not be in isolation in the first instance. This may of course still not resolve the fact that words are nonetheless being *presented* in isolation, a fact

which itself may not truly measure the iconic values of said words. To combat this, future studies could consider larger constructions and phrases for measurements of iconicity as opposed to presenting stimulus words in isolation (also see Chapter 4.6).

Once stimuli have been decided upon, and the manner of presentation/articulation chosen, the next important decision involves the translation of foreign stimuli.

Translations are always going to be an issue in iconicity research as they will almost never completely represent the meaning signified in the target language (Lahmami, 2016). Granted, this is increasingly a problem with larger units such as idiomatic phrases (Nesselhauf, 2009), and the more formulaic constructions in language (see Wray, 2005; Wray & Perkins, 2000), but even at the level of the word, there is often something missing when translating from one language to another. Aside from with very common concrete nouns such as cat, dog, and house (although, arguably even for these), translations are, at best, ‘a mere approximation’ (Forster, 1958:6). For many words, there is no one ‘perfect translation [...] which fulfils the same purpose in the new language as the original did in the language in which it was written’ (ibid.). Take for instance the word *kafara*. As explained previously, many translate this as *he disbelieved*, though this word primarily means *to cover up*, thereafter *to disbelieve*, yet both meanings are understood simultaneously as linked to each other. Such shades of meanings are impossible to convey succinctly in another language without prior knowledge of the target. When translating therefore, the ideal translation would have the same impact, style and impression on the target readers as the original (Lahmami, 2016:18). Impeccable translation is an incredibly difficult and arguably impossible task. To mitigate the chance of erroneous translations, multiple translations may be considered and the most apt chosen by a speaker fluent in both languages.

Lastly, when one considers linguistic material as an independent variable in any experiment, it must be considered what precisely is being measured: is it the word, the phonemes, the syllable, the morphology or something larger such as the syntax? Not everything can be measured in one experimental task and thus there is often conflation between variables. Kantartzis and colleagues point out for example that it is still unclear what English children consider iconic about words—the phonetics, phonotactics, prosody or all three (Kantartzis et al., 2011). As precise as sound-symbolism experiments are, pinpointing of specific variables is still difficult.

For instance, when considering morphology, some may posit that the highly conjugational, templatic structure of nearly all Arabic words affect the iconicity of Arabic words.

Whilst certainly the phonemes of Arabic, which contain relatively ‘exotic’ and often ‘harsh’ guttural phonemes entirely foreign to English may play a large factor, this is at the level of the phoneme. The effects of the *morphology* of Arabic is not something that can be measured in isolated tasks such as these: words are presented without comparison to other words derived from the same root, so the nature of Arabic’s morphology is chiefly omitted and untested in such experiments—dulling any possible effects on participants. Separate experiments can be used to investigate this further however, as I strongly believe that the morphology of Arabic (and Qur’anic Arabic in particular) does present salient iconic properties. Consider for instance the three words for *patience* used in the Qur’anic story of Moses in Chapter 18: /tastatʕiʕa/ is used at the beginning of the interaction where Moses’ companion tells him *you will [not] be patient*. Moses assures him he will. As the interaction draws on, and the events appear more strange and unsettling, the shorter form /tastatʕiʕ/ is used to again remind Moses but the clipped morphology indicates even less patience. Finally, when Moses’ patience has indeed dwindled at the purported cruelty he has seen, his companion uses the word /tastʕiʕ/; all of these are dwindling version of the same morphological construct, reflecting the diminishing patience of Moses (Bahaa-Eddin, 2015). One of the key examples of syntactic iconicity is Caesar’s famous quote *veni, vidi, vici* in which the word or syntax order may similarly be seen as an iconic depiction of events (Willems & De Cuyper, 2008:3)—in this case, chronology.

Deeper Qur’anic syntactic/morphological comparisons would have been particularly fascinating to present to non-native speakers (presenting a complete verse, or even phrase, with all words in context) and gauge if the established ‘iconic’ forms hold true, but unfortunately such comparisons were beyond the scope of the current thesis, and can hopefully be taken up in future research.

4.3.2 Methods, and evaluating the construct validity of iconicity research

There is considerable variety in the methods used to measure iconicity, including open-ended questions, corpus studies and classification tasks (Motamedi et al., 2019). This study utilised two approaches: a rating experiment and a forced-choice judgement task. In these two experiments, there appear to have been a number of factors influencing iconicity results, and to differing levels. Firstly is the Phoneme Similarity Framework, which appears more prevalent in the rating task in non-Arab participants. This is to be somewhat expected; the most transparent valence results are obtained with native speaker judgments (Winter, 2019a) and so conversely external factors will influence more so on non-natives. Thus, for such rating studies, native speaker judgements should be used for the primary data and analyses²⁸ whilst non-native speaker data can be used as comparison points such as through forced-choice tasks, and to locate potential confounds (such as PSF) or, alternatively, results can be applied and interpreted in other ways, such as for language learning to these groups (e.g., see Chapter 4.5.1), or language processing theory (Motamedi et al., 2019).

There are also a variety of reasons aside from PSF why non-native speaker results may appear significantly lower than native speakers, such as in the case with Experiment One. Auracher et al., (2010) argue that ‘conventional’ iconicity is acquired through experience with one’s own language; at the level of systematicity, native speakers might be able to work out whether a novel word is a noun or verb based on its length or phonotactics (Fitneva et al., 2009); other studies have shown there are phonological cues predictive of major word classes in different languages (see Dingemanse et al., 2015). A non-native speaker may not be attuned to ‘conventional associations’ (Motamedi et al., 2019), in absence of prior linguistic and cultural knowledge, which otherwise help match iconic signals for native speakers. Styles and Gawne (2017) explain that words that were phonotactically inconsistent with participants’ native languages could slow down performance in experimental tasks due to cognitive load (also see Motamedi, 2019). This increase in cognitive load may manifest itself in lower ratings as the dissimilarities between the two languages may create an association of arbitrariness.

²⁸ Of course, there are also criticisms of native speaker judgments, as raised above. Being embedded in the language, they may perceive iconicity that is not truly there.

It must be noted however that a larger methodological issue with rating tasks is that raters might respond carelessly or idiosyncratically (Motamedi et al., 2019), particular with the exponentially growing use of online ratings (Mason & Suri, 2012). A failsafe such as the clapping alternative used in the current study, or a script that evaluates and excludes random/idiosyncratic responses (e.g., see Motamedia et al., 2019) can be used to help sift through invalid data.

Rating tasks allow for the ‘perception’ of iconicity to be understood, however, again, this may be argued to be more a measurement of perception than anything else, though perhaps *perception* is the most valid benchmark definition of iconicity. The fundamental question of what is being measured is truly teased out when comparing the two experiments. Certainly it cannot be denied that a forced-choice design is less dependent on the subjectivity of ratings (Motamedi et al., 2019) in that there are objective truths to what a word means in another language. This, to some degree, can be used to eliminate the unrealised, immanent biases of a subjective perception rating. But which is the best test of iconicity?

Ultimately, neither is necessarily better, but rather more applicable in particular contexts, depending on what the researcher wishes to test. As concluded by Motamedi et al. (2019), a method that looks at how well participants recognise form-meaning mappings (e.g., a forced-choice task) tests something different from a method that asks participants to classify signals on a scale, though they both fall under the umbrella of iconicity research. Experiment Two, the forced-choice guessing task, still inescapably measures the perceptions of participants, as there are a number of variables that play a part when comparing a word to four options. However this method may be deemed less riddled with confounds and a stronger test for non-native speakers. Hence, something learned from these experiments is that the outcome of the multiple-choice task depends on the options that are used along with the correct answer. For example, if one happens to sound similar to the target word, then it is likely to draw a lot of selections, seemingly due to the systematic relationship (Dingemanse et al., 2015; Nielsen, 2016) between the phonemes in the two words.

If indeed ‘the hallmark of an iconic signal is the ability of naive perceivers to guess its meaning from its form’ (Motamedi et al., 2019) then forced-choice tasks may be considered ‘functionally’ superior to rating tasks (ibid.). They allow a test of the degree to which a meaning can be guessed by its form. Natives are not guessing—they already know; their subjective ratings are a measurement of the perception of iconicity: non-native speakers measure ‘primary iconicity’ by its traditional definition (Kwon, 2017; also see Gasser et al., 2005).

Granted, rating tasks allow for gradations from non-iconic to iconic, however this may still be comparatively less objective and more prone to interference from confounds such as PSF. On the other hand, a core issue with the forced-choice method is observing replicability across studies. Whilst in a rating task the stimuli need only be replicated from Language A to Language B and then rated on a scale, operationalising the alternative choices in replicated forced-choice tasks brings about a whole host of new problems. What will each ‘other’ option be? If the choices are taken at random from the stimuli pool of that particular study, then every study’s choices will be different, leading to inconsistent stimuli which are now incomparable (although with enough data, the ‘noise’ from the different alternatives will average out). One way around this may be to only use a consistent or fixed pool of stimuli words across a range of studies on different languages, and each study would randomly select from the pool, albeit in their native tongue.

Perlman et al. (2018) raises another (similar) point regarding the consistency of stimuli in such tasks: because their study relied ‘opportunistically’ on samples of rated signs and words that were not originally selected for cross-modal comparison, the ratings that overlapped across languages were ‘somewhat lacking in systematic coverage of the semantic domains that might be of most interest’. Consistent stimuli is not only hugely necessary for a plethora of reasons, but is in fact an achievable goal to aid in operationalising a future in iconicity research, allowing for a more transparent representation of sound-symbolism across various world languages.

Other issues regarding stimuli choices in forced-choice tasks are found in previous studies. Previously, stimuli used in binary forced-choice tasks have been typically designed for maximal contrast and minimal complexity (Dingemanse et al., 2016) such as the pseudowords *kiki* and *bouba*, which are ultimately artificial and lack ecological validity (Schmuckler, 2001) or applicability to natural languages and contexts. When measures are controlled, findings of iconicity do not appear as sensational (e.g., see Monaghan et al., 2012; Dingemanse et al., 2016) but perhaps more realistic and ecologically valid. The current study aimed to maximise ecological validity by utilising the same natural stimuli-pool, and so, where future studies can (if stimuli-pools are large enough) they may wish to design tasks similarly in similar attempts to maximise ecological validity.

4.4 Overview of ‘Iconic’ Words, Phonaesthemes and the Arabic literature sources

Previously we discussed in detail the results of the three parts of speech, and in some detail the scores of the ‘Iconic Words’ and Phonaesthemes categories of the present study. The current subchapter will unpack these latter two categories further, with reference to the literature they stem from. There will also be a discussion on how the results of the current study informs our understanding of potential ideophonicity, phonaesthemes, and iconicity in the Qur'an.

Does Bahaa-Eddin’s (2015) ideophone study hold weight?

16/20 Iconic Words were taken from Bahaa-Eddin (2015) in which he lists words he considers to be Arabic ‘ideophones’. He adopts what appears to be a less stringent definition of ideophonicity, where any word that evokes (to him—subjectively) a sense of form-meaning resemblance was considered an ideophone (on the other hand, see Dingemanse et al., 2012). By the understanding of Bahaa-Eddin, the present paper can either confirm his subjective choices of Qur'anic words as ideophones due to resulting high levels of iconicity, or, otherwise, show through objective data that these words were not in actuality ideophonic due to lack of perceived iconicity in native or naive participants.

This is in contrast to the definition of ideophones adopted throughout this paper, i.e., that of Dingemanse and colleagues (2012), which states that iconicity is not, according to Dingemanse, a defining criteria of ideophones, but rather they are words that (amongst other features) also comprise their own grammatical class in ideophone-rich languages, include repeated forms depicting repeated or iterative events, and contrasts between between ideophones depict analogous contrasts in magnitude and intensity.

In the current paper, the term *ideophone* was avoided with a precise definition still being to a degree still up for debate, and with languages like Arabic and English not containing a highly attested set of ideophones as in other languages (Perniss et al., 2010). This subchapter will discuss whether the Iconic Words of the current experiment words can indeed be considered

iconic (or arguably ideophonic), as Bahaa-Eddin maintains. The 4/20 words chosen by me will be separated for clarity.

The rating experiment showed that the Iconic Words category as a whole had an iconicity z-score of 0.41 for the English/European participants. The other two groups of participants rated them below the mean.

Of the 20 words, the 4 chosen by me were *ughriqu, they (were) drowned* (rating z-score -0.13); *sakeeynah, tranquility* (2.45); *dalaalaa, grave error* (0.8) and *waqaaraa, grandeur* (1.5). These 4 combined held an average z-score of 1.14. Excluding them from the 20 words left the 16 words with an average score of 0.29, mildly iconic, in the English/European group.

The forced-choice experiment showed that the 20 Iconic Words held an iconicity (closed guessability) z-score of -0.20. The 4 words chosen by me averaged a z-score of 0.05 and thus in fact positively raised the already negative iconicity z-score slightly for Bahaa-Eddin's other 16 words. The results of this experiment did not seem to prove Bahaa-Eddin's hypothesis.

In summation, we find tentative evidence for Bahaa-Eddin's claims. (Some) non-native speakers did perceive the words he outlines as at least mildly iconic, though this was not supported in the forced-choice study of Experiment Two. Whether these can be considered ideophones or not is a matter still up for debate. Ideophones can be considered highly expressive linguistic elements created to 'simulate [...] a sensory perception, emotion or event' (Willems & De Cuyper, 2008). In that, the English/European participant results of Experiment One support Bahaa-Eddin's claims of ideophoncity—or at least iconicity, and again, only to an extent—other ideophone scholars however may argue that ideophones have a rich inventory for expressing manners of action, certain properties of objects, and are not generally used to refer directly to objects (Perlman et al., 2018; Imai & Kita, 2014). The 16 words offered by Bahaa-Eddin were typically abstract nouns, and verbs of motion (e.g., see Perlman et al., 2018) but they did not particularly express sound concepts, which is higher in Dingemanse's (2012) implication hierarchy.

If the Iconic words of Baha-Eddin are considered possible ideophones, the words of Dingemanse (2016) may be worth bearing in mind. He found that the interpretation of ideophones in isolation was relatively difficult for naive participants due to them being contextually dependent (Samarin 1967, Childs 1994): '[t]he meanings of ideophones, even if reinforced by iconic properties and supported by prosody, are conventionalized and enriched by context just like other words' (Dingemanse, 2016). This may explain the mixed results found in Experiment One and Two. In the present study, only segmental information was provided:

Iconic Words were presented in isolation of prosody or linguistic context; they were not presented in a conventionalized construction or sentence and this may have taken away from some of the inherent sound-symbolism found in naturally-occurring ideophones.

Does Abdulsada's (2019) phonaestheme study hold weight?

Sometimes called 'relative iconicity' (Gasser et al., 2005), connected via systematicity (Lockwood & Dingemans, 2015), or the recurrence of phoneme clusters in several words (Magnus, 2005), diagrammatic iconicity (Buchler, 1955) in phonaesthemes are often considered to be independent of iconicity (though see Kwon, 2017). And, whilst these clusters are systematically related to each other (e.g., the recurrence of *gl-* in *glitter*, *glimmer* and *glisten* insofar as the refraction of light), the segments are thought to 'bear no obvious resemblance to this meaning' (Massaro and Perlman, 2017). In the current study of Qur'anic Arabic however, there is some evidence to show that phonaesthemes are in fact at least mildly iconic, as both Experiment One and Two provided support for this, although not as high as one might expect. In other studies, onomatopoeia and interjections (see Perry et al., 2015; Winter et al., 2017a) were found to be rated comparatively higher than other lexical categories due to factors such as higher sensory meaning (Winter et al., 2017a) or earlier age of acquisition (Perry et al., 2015).

Though the Influenced by Arabic group rated Phonaesthemes -0.09, mild iconicity can be found in the English/European participant group for Experiment One and Two with iconicity z-scores of 0.12 and 0.07 respectively. Iconicity ratings were even higher in Arabic Speakers, with a z-score of 0.30 in Experiment One. This was also when using a diverse range of phonaesthemes, and without the depth of testing multiple instances of the same phonaestheme onset cluster, i.e., only one word from each cluster was used in the phonaestheme stimuli-pool, creating a total of 20 clusters or phonaesthemes tested. Thus participants had no knowledge that the words they were rating and choosing for meaning were systematic constituents of larger phonaestheme cluster words.

The results provide positive evidence for the words chosen by Abdulsada being iconic, not only as seen in native speakers, but also non-native speakers. From the current evidence, phonaesthemes in the Qur'an do indeed appear to be iconic, at least to some small degree, and not just systematic.

4.5 Implications of Results

Chapter 4.5 will synthesise the entire discussion in an attempt to build bridges, aiming to make the current study and its results applicable to wider-reaching fields and spheres. Can the findings of this set of experiments in any way enlighten our study of Arabic language-learning, enrich our understanding of iconicity testing, or explain why the Qur'an is considered an iconic book by many of its reciters?

4.5.1 Language Learning

Iconicity is the feature of a signal that allows its meaning to be predicted from its form; functionally, this can make it easier for naive perceivers to guess the meaning of a signal (Motamedi, 2019; also known as 'primary iconicity' [see Kwon, 2017]). If naive speakers, or non-native speakers of a language, can guess the meaning of an iconic word 'well', this allows for researchers to create a direct relationship between the identification of iconic words and guidance for language learning.

Across languages, infants' early vocabulary consists of a 'surprisingly high proportion' of sound-symbolic words (Laing, 2019), with many studies proving that iconic words tend to be learnt early in the acquisition of vocabulary (e.g., see Massaro & Perlman, 2017; Perry et al., 2015; Tardif et al., 2008); and this has been found even when excluding onomatopoeia (see Perry et al., 2015). In the case of language learning, the literature supports the notion of iconic words being learnt first and thus 'prescribed' to young and old learners of a foreign tongue, for ease and efficiency in the language-learning process. Similarly, the findings of the current study pave a roadmap for potential language-learning in both Qur'anic Arabic, and, to an extent, Arabic as a whole. Undoubtedly, further studies are needed to confirm the findings seen thus far, but there does appear to be an order or hierarchy of word categories and individual words that may be followed when learning Qur'anic Arabic.

Lockwood et al. (2016) found that Dutch adults were able to learn foreign words best when they were mapped iconically onto their referent. The current study's two experiments in closed guessability and iconicity perception both presented Adjectives as highly iconic, followed

loosely by Verbs and Nouns²⁹, depending on experimental design. As Phonaesthemes and Iconic Words make up a small fraction of the words in the Qur'an (though Phonaesthemes are *consistently* mildly iconic; and Iconic Words *perceived* to be highly iconic, so an argument can be made to learn them early on) they may be relegated to later learning.

The Qur'an is made up of 77,430 words. Of these, just the top 10 most frequent words (including verb roots) appear 19,061 times (Duke & Buckwalter, 2010) or almost 25% of the entire Qur'anic vocabulary. This is known as Zipf's Law, which states that the frequency of word tokens in a large corpus of language is inversely proportional to the rank of said words (Sicilia-Garcia et al., 2002; also see Booth 1967, Goulden et al., 1990). In the same way that learning the most common ten words in Qur'an means language learnings have already now covered a significant portion of the Qur'an, a similar premise can be extended to the words found to be more iconic in the present study. Learning these words first (for instance those which were more meaning-transparent in Experiment Two) along with highly frequent words would allow for English language learners of Classical Arabic to have the most efficient route in learning the Qur'anic vocabulary, and this may be extended to learners from other backgrounds also, though the current findings are primarily for English L1 speakers.

The words in the Qur'an often present with a high level of systematicity (as seen in Adjectives) due to the inherently templatic nature of the Arabic lexicon. Motamedi (2019) argues that sound-meaning systematicity, 'if it exists', may aid in retrieval in a minimum of two ways: a naive listener may be able to interpret the general form of a word and deduce a 'general connotation', and thus, secondly, it may aid in reducing lethologica, or tip-of-the-tongue syndrome (Beattie & Coughlan, 1999; Schwartz, 1999).

As a whole, Motamedi posits that systematicity, even if particular lexical items are not memorized, can act as an aid to language learning: if one learns that the most iconic adjectives in the Qur'an are *kareeym*, *qaleeyl*, and *azheeym*, the systematic relationship between them (even in absence of their precise denotation) can allow for the language-learner to classify future words ending in *-eey_* as adjectival in some broad way. This same general premise is applicable to verbs and nouns. Interestingly, perhaps because this is easily overlooked, the idea of this subconscious systematic learning is particularly applicable to phonaesthemes. Granted, phonaesthemes do not make up a large portion of the lexicon, but the current study has

²⁹ Arabic verbs should ideally be learnt before nouns. As Arabic is a highly conjugational language, learning a trilateral root (verb) allows for the noun to be easily understood and/or conjugated. Arguably, this may be just as effective a technique vice versa. However, as Arabic verbs have more variance in their form, precedence has been given to them first.

indicated the somewhat iconic nature of phonaesthemes across dual experimental designs. For language learning, this may be useful. Compounded to the already systematic nature of Arabic, learning a few key onsets (e.g., as found in Abdulsada, 2019) may be extremely effective for a budding language-learner: upon hearing a new or rarely used word, a listener may be able to 'tune' to the general form of the word (Styles & Gawne, 2017). They may also tap into their knowledge of a more broad phonaesthetic onset, if one exists (Bromberg, 2007; Kwon, 2017), thus allowing individuals to relate it to other, more familiar words that fall into the same form-meaning grouping, if and where possible.

4.6 Future studies in iconicity

What can be done to take this study further and build upon the work thus far? This will be the final exploration of the thesis and this section will end with my personal, speculative comments on how iconicity may affect a reciter's or listener's perception of the Qur'an.

One of the most salient findings of the current study is the difference in results between the two experimental designs used, even in the same participant group(s). Though this has been discussed throughout the thesis, it is worth duly stressing for future studies into sound-symbolism.

The current paper utilised both a rating-scale task-set and forced-choice design, with varying results. There is still much work to be done to best understand the differences between these two measurements and what exactly is being measured by both, and some light may be shed by Thompson A.L. et al. (2020). In their iconicity-rating comparisons between Japanese and English (using the data from Perry et al., 2015), they proposed that ratings in fact 'reflect a word's relationship to sensory information rather than iconicity'; this was after controlling for language strata and historical iconic etymology. At least tentative support for this may be found in Winter et al. (2017a) where they found English words with higher sensory experience ratings were higher rated in iconicity (also see Perlman et al., 2018)³⁰.

As time goes on and more studies are conducted, it becomes more and more apparent that '[n]o single method has privileged access to iconicity' (Winter & Perlman, in press), and we should be thus careful to appoint any one method as the be-all, end-all 'litmus test' (Thompson, A.L. et al., 2020). Rating tasks tap into a certain construct that we are still trying to best define, though that seems to be centralized around the perceptions of participants, whilst forced-choice methods better tap into another noticeably different construct, that can be, broadly speaking, considered objectively accurate or not. Variety is key, and overall, 'when it comes to understanding something as complex as human language, it will be most productive to use every method that is available' (Dąbrowska, 2016:57).

Every language is different. And, since no two languages are identical, 'it stands to reason that there can be no absolute correspondence between languages' (Nida, 1964:156). Perceived

³⁰ Though, of course, this may be two sides of the same coin. Flipped, one may argue that more sensory words are predisposed to heightened levels of iconicity. This is, at its core, difference in understanding the definition of iconicity and its relation to sensory information.

iconicity ratings will always differ between languages, with native-speakers generally rating their mother tongue at higher levels of iconicity, and non-natives, lower. Just because English speakers did not rate many of the words high in iconicity is not necessarily an indication of other language speakers' perceptions—other languages and speakers that have not been tested in this study. Similarly, for a fair future comparison across languages, the forced-choice task-set can also be replicated with different groups of participants to test for differences in accuracy. Future replicatory work is pivotal for factors such as PSF to be teased out and eventually controlled for.

Sadly, many other factors—in some cases extremely fascinating—have not been deeply analysed due to the scope of the current paper. For example, Westbury and Hollis (2019) found that in English, funny words tend to not only be structurally marked (e.g., the suffix *-le* in *waddle*) but also correlate with high levels of iconicity; Arabic, being a conjugational and structurally marked language, may similarly exhibit other patterns related to iconicity.

Winter et al. (2017b) found that cross-linguistically, language tended to use the /r/ phoneme in words pertaining to roughness or coarseness. Whilst the current stimuli list did not contain a plethora of words directly related to the concept of *rough*, the Adjective *stern* (*shadeedh*) was rated a z-score of 1.36 in the English/European, 1.55 in the Arabic Speaking, and 1.50 in the Influenced by Arabic groups respectively, providing some preliminary evidence even from the limited pool of words used here.

Arabic orthography was deliberately omitted from the current study to allow for a solely auditory experience in the absence of possibly confounding variables (*iconicity* in its purest form); yet when breaking down the semiotic package into iconicity and orthography as separate features, written text is often understood to have inherently iconic underpinnings, that is, a 'pictorial' quality, which is 'especially true of some Islamic calligraphy' (Schick, 2008). Future replications of studies into Arabic iconicity may attempt to pursue this, as Arabic calligraphy has often been described as 'deeply polysemic' (Schick, 2008), 'sensual' (Plate, 2010) and iconic (see Bouabdallah, 2020), perhaps comparable to the visual contrasts of angularity and spikiness found in the kiki-bouba effect (see Fort et al., 2015).

Overall, there are lots of paths that can be taken with future studies into Arabic iconicity, and there is a lot of work still to do. The present paper hopes to have laid down one of the initial stones on the long road to a robust framework: a framework which will help aid in the understanding of this incredibly complex and fundamentally very human phenomenon of iconicity in language.

5.4.1 Some final comments on improvement

Perhaps the Qur'an is the most memorized book in the world purely due to its religious, literary and cultural status. But perhaps, perhaps there is a small chance that the Qur'an contains something deeper. Perhaps the Qur'an is often considered easy to learn and easy to visualise because there is something inherently iconic at play that makes it up. Iconicity is a tried and tested reality, undeniably more modest than some claim, but existent nonetheless. Perhaps the Qur'an benefits from the inherently systematic and conjungational nature of its lexicon, its use of structurally marked adjectives for instance, and the employment of Classical Arabic as a whole. The orthography of the words may lend themselves to iconic interpretation, but it is particularly the sound-symbolic properties, as suggested by the current paper, that could allow for visualisation and memorization for the vast majority of Muslims who are not native speakers of Arabic.

Arguably, the most important factor that has been wholly left out of the current study is the lack of contextualization of Qur'anic words. Though this has been briefly addressed numerous times, the pivotal fact remains that the entire study, in all of its multiple experimental designs and variants, presented words from the Qur'an on their own. Yet, in the Quran, words do not appear in isolation. Words are a part of sentences, and these sentences even, are composed of phrases, and these are all within the context of other sentences (Lahmami, 2016). The meaning of a word cannot be isolated from its context (Cruse, 2000). This is especially exigent when assessing the effect of ostensibly 'Iconic' words: Dingemanse (et al., 2016) found that the interpretation of ideophones in isolation was relatively difficult for naive participants due to them being contextually dependent, even when reinforced by iconic properties and supported by prosody. The current study stripped words of their prosody, but more importantly, all words were also stripped from their larger narrational structure, which may be argued to be one of the most iconic elements of the Qur'an. And it is this larger narrative structure that is seminal to not only a true assessment of potential ideophoncity, but also a holistic view of the Qur'an in light of its iconic structure.

5.0 Conclusion

Whilst there have been a growing number of studies into iconicity generally, until now there have not been any objective experimental studies conducted on iconicity in the Qur'an, nor Arabic more generally. Through a number of methods, the current paper aimed to address the claims of two papers on Arabic iconicity, one on 'Ideophones' by Bahaa-Eddin (2015) and one on Phonaesthemes by Abdulsada (2019). Results found mild levels of iconicity for both authors' claims in terms of ratings, with the Phonaesthemes supported by both rating and forced-choice experiments.

Muslims often make claims that the Qur'an is a linguistic miracle (see Arberry, 2007; Tzortzis, 2012), including claims of iconicity but typically in absence of objective data; the present paper aimed to quantify iconicity measurements for three *parts of speech* in the Qur'an, and in doing so, replicated findings for ratings seen previously in English (Perry et al., 2015), that is a hierarchy of Adjective > Verb > Noun across three groups. A forced-choice task found closed guessability in English participants to be hierarchically similar. Of these results, adjectives in the Qur'an were found to be highly iconic, with some adjectives being chosen for meanings at rates of 55% accuracy when presented with four choices. Such order structures can inform our procedure and efficiency in language learning for Arabic learners. When compared to other studies into iconicity, the findings of the rating task place Arabic more in line with English than Spanish, a satellite-framed language, and the linguistic data allows for Qur'anic Arabic to be compared to other languages in future meta-analyses and general studies. As a result of a sustained examination of experimental design and method, it was found that in both experiments, the phenomenon dubbed the *Phoneme Similarity Framework* appeared to play a salient role in the iconicity ratings and forced-choice closed guessing accuracy in naive participants. Participants overwhelmingly ended up equating iconicity to systematicity: the systematic relationship between the phonemes in the stimulus and target words, and this appears to be at an unconscious level. Such variables may inform future work into, and the testing of, iconicity, where construct validity has been a topic of great debate in recent times.

There is still much work to do—such as replication in different formats, not least with the contextualisation of words to test for the validity of an ideophonic interpretation (see previous)—however, at least at the most modest level, the current study mainly aimed to fill a gap in the literature. In that, I believe it has succeeded. And hopefully, this humble piece has

opened the door for a deeper, more robust, analytical perusal into iconicity in Arabic as well as its effects on the perception of the most important book in the Muslim world: the Qur'an.

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Appendix

Full set of results (excluding guessing accuracy z-score; for this please see <https://osf.io/arzfs/>):

Experiment	Group	Word	Quranic Frequency	Category	Iconicity Rating	Rating zscore	Guessing Accuracy
Main	Arabic Speakers	A lot	21	Adjective	5.227	0.984	
Main	Arabic Speakers	A shaking	1	Phonaestheme	5.409	1.362	
Main	Arabic Speakers	A spread	1	Iconic	4.550	-0.421	
Main	Arabic Speakers	All-Hearing	8	Adjective	4.900	0.305	
Main	Arabic Speakers	All-seeing	20	Adjective	4.091	-1.374	
Main	Arabic Speakers	Body	4	Phonaestheme	4.250	-1.044	
Main	Arabic Speakers	Book	260	Noun	4.737	-0.033	
Main	Arabic Speakers	Clear/transparent	119	Adjective	4.150	-1.251	
Main	Arabic Speakers	Command	166	Noun	5.000	0.513	
Main	Arabic Speakers	Constantly forgiving	29	Adjective	4.905	0.315	
Main	Arabic Speakers	Criminals	8	Adjective	4.700	-0.110	
Main	Arabic Speakers	Earth	461	Noun	4.909	0.324	
Main	Arabic Speakers	Easy	3	Iconic	4.143	-1.266	
Main	Arabic Speakers	Family	127	Noun	4.526	-0.470	
Main	Arabic Speakers	Fire	145	Noun	4.773	0.041	
Main	Arabic Speakers	Good/goodness	148	Noun	4.105	-1.344	
Main	Arabic Speakers	Grandeur	1	Iconic	4.450	-0.629	
Main	Arabic Speakers	Grave error	38	Iconic	4.636	-0.242	
Main	Arabic Speakers	Hand	120	Noun	3.842	-1.890	
Main	Arabic Speakers	Hardship	19	Iconic	5.048	0.612	
Main	Arabic Speakers	He believed	537	Verb	4.850	0.201	
Main	Arabic Speakers	He brought	264	Verb	4.136	-1.279	
Main	Arabic Speakers	He called	170	Verb	4.636	-0.242	
Main	Arabic Speakers	He came	278	Verb	5.048	0.612	
Main	Arabic Speakers	He covered	289	Verb	3.900	-1.770	
Main	Arabic Speakers	He created	184	Verb	4.682	-0.148	
Main	Arabic Speakers	He dispersed	5	Iconic	4.300	-0.940	
Main	Arabic Speakers	He feared	40	Phonaestheme	4.905	0.315	
Main	Arabic Speakers	He followed	136	Verb	4.864	0.230	
Main	Arabic Speakers	He gave	271	Verb	4.476	-0.574	

Main	Arabic Speakers	He intended	139	Verb	4.905	0.315	
Main	Arabic Speakers	He lied	176	Verb	4.850	0.201	
Main	Arabic Speakers	He made	340	Verb	3.850	-1.874	
Main	Arabic Speakers	He perished	5	Phonaestheme	5.250	1.032	
Main	Arabic Speakers	He revealed/sent down	183	Verb	5.048	0.612	
Main	Arabic Speakers	He said	1618	Verb	5.000	0.513	
Main	Arabic Speakers	He saw	271	Verb	4.250	-1.044	
Main	Arabic Speakers	He sent	130	Verb	5.000	0.513	
Main	Arabic Speakers	He spread/expand something	1	Iconic	3.850	-1.874	
Main	Arabic Speakers	He suppresses them	3	Phonaestheme	4.000	-1.562	
Main	Arabic Speakers	He took	127	Verb	4.810	0.117	
Main	Arabic Speakers	He touched	56	Iconic	5.364	1.267	
Main	Arabic Speakers	He was God-conscious	166	Verb	4.250	-1.044	
Main	Arabic Speakers	He wished	236	Verb	4.143	-1.266	
Main	Arabic Speakers	He worked/did	276	Verb	4.810	0.117	
Main	Arabic Speakers	Heart	132	Noun	5.409	1.362	
Main	Arabic Speakers	Heat	3	Phonaestheme	5.300	1.135	
Main	Arabic Speakers	Humanity	241	Noun	3.684	-2.218	
Main	Arabic Speakers	Humiliation	4	Iconic	3.800	-1.977	
Main	Arabic Speakers	Iron	6	Iconic	5.238	1.007	
Main	Arabic Speakers	Large	32	Adjective	4.450	-0.629	
Main	Arabic Speakers	Little (in quantity)	27	Adjective	5.095	0.710	
Main	Arabic Speakers	Lord	975	Noun	5.100	0.720	
Main	Arabic Speakers	Noble	28	Adjective	4.857	0.216	
Main	Arabic Speakers	One worthy of worship	147	Noun	5.048	0.612	
Main	Arabic Speakers	Other	144	Noun	4.650	-0.214	
Main	Arabic Speakers	Painful	72	Adjective	5.000	0.513	
Main	Arabic Speakers	Path	45	Iconic	4.905	0.315	
Main	Arabic Speakers	People/Nation	383	Noun	4.524	-0.475	
Main	Arabic Speakers	Perversity	1	Iconic	4.190	-1.167	
Main	Arabic Speakers	Portion	1	Phonaestheme	4.571	-0.377	
Main	Arabic Speakers	Rage	6	Iconic	4.750	-0.006	
Main	Arabic Speakers	Repel	2	Phonaestheme	4.045	-1.468	

Main	Arabic Speakers	Returned	36	Phonaestheme	5.421	1.386	
Main	Arabic Speakers	Ridicule	11	Phonaestheme	5.048	0.612	
Main	Arabic Speakers	Riding	1	Phonaestheme	4.250	-1.044	
Main	Arabic Speakers	She closed	1	Phonaestheme	5.050	0.617	
Main	Arabic Speakers	Shook	1	Phonaestheme	5.476	1.501	
Main	Arabic Speakers	Sign	382	Noun	4.762	0.019	
Main	Arabic Speakers	Sky	310	Noun	5.300	1.135	
Main	Arabic Speakers	Slave	131	Noun	4.850	0.201	
Main	Arabic Speakers	Something	283	Noun	4.810	0.117	
Main	Arabic Speakers	Stable abode	9	Iconic	3.591	-2.411	
Main	Arabic Speakers	Stern	36	Adjective	5.500	1.550	
Main	Arabic Speakers	Stormy	2	Phonaestheme	5.095	0.710	
Main	Arabic Speakers	Swallow	1	Phonaestheme	5.045	0.607	
Main	Arabic Speakers	The All-Knowing	101	Adjective	4.429	-0.673	
Main	Arabic Speakers	The earthquake	4	Iconic	4.905	0.315	
Main	Arabic Speakers	The Giver of Serenity	1	Adjective	4.714	-0.080	
Main	Arabic Speakers	The Great	104	Adjective	5.600	1.758	
Main	Arabic Speakers	The lowest level	74	Adjective	3.900	-1.770	
Main	Arabic Speakers	The More/Most Knowledgeable	16	Adjective	5.100	0.720	
Main	Arabic Speakers	The Most Merciful	112	Adjective	5.333	1.204	
Main	Arabic Speakers	The Most Mighty	101	Adjective	5.000	0.513	
Main	Arabic Speakers	The Most Wise	84	Adjective	4.857	0.216	
Main	Arabic Speakers	The self/soul	295	Noun	5.190	0.908	
Main	Arabic Speakers	They (were) drowned	17	Iconic	5.381	1.303	
Main	Arabic Speakers	They cut	29	Phonaestheme	5.286	1.106	
Main	Arabic Speakers	They gathered	22	Phonaestheme	5.091	0.701	
Main	Arabic Speakers	They went forth	5	Phonaestheme	4.524	-0.475	
Main	Arabic Speakers	They went out	53	Phonaestheme	5.143	0.809	
Main	Arabic Speakers	Thunder	2	Iconic	5.350	1.239	
Main	Arabic Speakers	To screech/croak	1	Iconic	4.947	0.404	
Main	Arabic Speakers	Tranquility	6	Iconic	5.000	0.513	
Main	Arabic Speakers	Truth	242	Noun	5.429	1.402	
Main	Arabic Speakers	Virtuous/Pious	5	Adjective	5.143	0.809	
Main	Arabic Speakers	Was	1358	Verb	5.250	1.032	
Main	Arabic Speakers	Way	176	Noun	3.810	-1.958	

Main	Arabic Speakers	We shattered	1	Iconic	4.750	-0.006	
Main	Arabic Speakers	You slipped	2	Phonaestheme	4.818	0.135	
Main	English/European	A lot	21	Adjective	3.280	0.162	0.333
Main	English/European	A shaking	1	Phonaestheme	2.680	-0.717	0.098
Main	English/European	A spread	1	Iconic	3.440	0.397	0.231
Main	English/European	All-Hearing	8	Adjective	2.440	-1.069	0.250
Main	English/European	All-seeing	20	Adjective	3.320	0.221	0.308
Main	English/European	Body	4	Phonaestheme	2.320	-1.245	0.154
Main	English/European	Book	260	Noun	2.720	-0.659	0.235
Main	English/European	Clear/transparent	119	Adjective	2.880	-0.424	0.346
Main	English/European	Command	166	Noun	3.640	0.690	0.423
Main	English/European	Constantly forgiving	29	Adjective	3.040	-0.189	0.423
Main	English/European	Criminals	8	Adjective	4.000	1.218	0.309
Main	English/European	Earth	461	Noun	3.160	-0.013	0.269
Main	English/European	Easy	3	Iconic	2.960	-0.307	0.231
Main	English/European	Family	127	Noun	3.520	0.514	0.192
Main	English/European	Fire	145	Noun	2.400	-1.128	0.308
Main	English/European	Good/goodness	148	Noun	2.880	-0.424	0.235
Main	English/European	Grandeur	1	Iconic	4.160	1.453	0.269
Main	English/European	Grave error	38	Iconic	3.720	0.808	0.212
Main	English/European	Hand	120	Noun	2.120	-1.538	0.288
Main	English/European	Hardship	19	Iconic	3.600	0.632	0.308
Main	English/European	He believed	537	Verb	3.000	-0.248	0.462
Main	English/European	He brought	264	Verb	2.520	-0.952	0.212
Main	English/European	He called	170	Verb	3.040	-0.189	0.173
Main	English/European	He came	278	Verb	3.440	0.397	0.135
Main	English/European	He covered	289	Verb	3.960	1.159	0.288
Main	English/European	He created	184	Verb	2.680	-0.717	0.231
Main	English/European	He dispersed	5	Iconic	3.200	0.045	0.115
Main	English/European	He feared	40	Phonaestheme	3.200	0.045	0.250
Main	English/European	He followed	136	Verb	2.040	-1.656	0.327
Main	English/European	He gave	271	Verb	3.160	-0.013	0.327
Main	English/European	He intended	139	Verb	2.120	-1.538	0.231
Main	English/European	He lied	176	Verb	2.600	-0.835	0.308
Main	English/European	He made	340	Verb	1.880	-1.890	0.231
Main	English/European	He perished	5	Phonaestheme	3.000	-0.248	0.385

		He revealed/sent					
Main	English/European	down	183	Verb	3.600	0.632	0.404
Main	English/European	He said	1618	Verb	2.440	-1.069	0.269
Main	English/European	He saw	271	Verb	2.560	-0.893	0.481
Main	English/European	He sent	130	Verb	3.560	0.573	0.250
		He spread/expand					
Main	English/European	something	1	Iconic	4.560	2.039	0.529
Main	English/European	He suppresses them	3	Phonaestheme	3.200	0.045	0.519
Main	English/European	He took	127	Verb	2.280	-1.304	0.412
Main	English/European	He touched	56	Iconic	2.640	-0.776	0.250
		He was					
Main	English/European	God-conscious	166	Verb	2.440	-1.069	0.212
Main	English/European	He wished	236	Verb	3.240	0.104	0.288
Main	English/European	He worked/did	276	Verb	2.400	-1.128	0.231
Main	English/European	Heart	132	Noun	3.120	-0.072	0.308
Main	English/European	Heat	3	Phonaestheme	4.000	1.218	0.327
Main	English/European	Humanity	241	Noun	3.400	0.338	0.231
Main	English/European	Humiliation	4	Iconic	4.280	1.629	0.269
Main	English/European	Iron	6	Iconic	2.680	-0.717	0.231
Main	English/European	Large	32	Adjective	4.200	1.511	0.255
Main	English/European	Little (in quantity)	27	Adjective	3.720	0.808	0.442
Main	English/European	Lord	975	Noun	3.200	0.045	0.212
Main	English/European	Noble	28	Adjective	3.400	0.338	0.549
		One worthy of					
Main	English/European	worship	147	Noun	3.400	0.338	0.346
Main	English/European	Other	144	Noun	2.360	-1.186	0.135
Main	English/European	Painful	72	Adjective	3.040	-0.189	0.231
Main	English/European	Path	45	Iconic	2.760	-0.600	0.132
Main	English/European	People/Nation	383	Noun	3.200	0.045	0.288
Main	English/European	Perversity	1	Iconic	2.080	-1.597	0.250
Main	English/European	Portion	1	Phonaestheme	1.960	-1.773	0.288
Main	English/European	Rage	6	Iconic	4.360	1.746	0.173
Main	English/European	Repel	2	Phonaestheme	3.560	0.573	0.269
Main	English/European	Returned	36	Phonaestheme	4.280	1.629	0.423
Main	English/European	Ridicule	11	Phonaestheme	4.040	1.277	0.385
Main	English/European	Riding	1	Phonaestheme	3.640	0.690	0.250
Main	English/European	She closed	1	Phonaestheme	2.160	-1.480	0.269

Main	English/European	Shook	1	Phonaestheme	3.600	0.632	0.308
Main	English/European	Sign	382	Noun	2.320	-1.245	0.077
Main	English/European	Sky	310	Noun	3.840	0.983	0.192
Main	English/European	Slave	131	Noun	2.360	-1.186	0.250
Main	English/European	Something	283	Noun	3.600	0.632	0.231
Main	English/European	Stable abode	9	Iconic	2.360	-1.186	0.212
Main	English/European	Stern	36	Adjective	4.080	1.335	0.308
Main	English/European	Stormy	2	Phonaestheme	4.560	2.039	0.154
Main	English/European	Swallow	1	Phonaestheme	3.080	-0.131	0.160
Main	English/European	The All-Knowing	101	Adjective	3.520	0.514	0.404
Main	English/European	The earthquake	4	Iconic	4.000	1.218	0.250
Main	English/European	The Giver of Serenity	1	Adjective	3.400	0.338	0.308
Main	English/European	The Great	104	Adjective	4.160	1.453	0.442
Main	English/European	The lowest level	74	Adjective	3.040	-0.189	0.365
Main	English/European	The More/Most Knowledgeable	16	Adjective	3.040	-0.189	0.365
Main	English/European	The Most Merciful	112	Adjective	2.480	-1.010	0.231
Main	English/European	The Most Mighty	101	Adjective	3.680	0.749	0.288
Main	English/European	The Most Wise	84	Adjective	3.120	-0.072	0.327
Main	English/European	The self/soul	295	Noun	3.760	0.866	0.423
Main	English/European	They (were) drowned	17	Iconic	3.080	-0.131	0.235
Main	English/European	They cut	29	Phonaestheme	4.040	1.277	0.404
Main	English/European	They gathered	22	Phonaestheme	2.760	-0.600	0.423
Main	English/European	They went forth	5	Phonaestheme	3.080	-0.131	0.269
Main	English/European	They went out	53	Phonaestheme	2.480	-1.010	0.154
Main	English/European	Thunder	2	Iconic	4.560	2.039	0.212
Main	English/European	To screech/croak	1	Iconic	3.400	0.338	0.192
Main	English/European	Tranquility	6	Iconic	4.840	2.450	0.442
Main	English/European	Truth	242	Noun	2.800	-0.541	0.250
Main	English/European	Virtuous/Pious	5	Adjective	2.880	-0.424	0.308
Main	English/European	Was	1358	Verb	2.160	-1.480	0.192
Main	English/European	Way	176	Noun	2.440	-1.069	0.135
Main	English/European	We shattered	1	Iconic	3.040	-0.189	0.269
Main	English/European	You slipped	2	Phonaestheme	3.480	0.456	0.288
Main	Influenced by Arabic	A lot	21	Adjective	3.160	-1.315	
Main	Influenced by Arabic	A shaking	1	Phonaestheme	3.615	-0.634	

Main	Influenced by Arabic	A spread	1	Iconic	3.800	-0.357	
Main	Influenced by Arabic	All-Hearing	8	Adjective	4.080	0.062	
Main	Influenced by Arabic	All-seeing	20	Adjective	4.560	0.780	
Main	Influenced by Arabic	Body	4	Phonaestheme	3.680	-0.537	
Main	Influenced by Arabic	Book	260	Noun	5.167	1.688	
Main	Influenced by Arabic	Clear/transparent	119	Adjective	3.885	-0.231	
Main	Influenced by Arabic	Command	166	Noun	4.120	0.122	
Main	Influenced by Arabic	Constantly forgiving	29	Adjective	4.923	1.324	
Main	Influenced by Arabic	Criminals	8	Adjective	4.250	0.316	
Main	Influenced by Arabic	Earth	461	Noun	4.833	1.189	
Main	Influenced by Arabic	Easy	3	Iconic	3.917	-0.183	
Main	Influenced by Arabic	Family	127	Noun	3.760	-0.417	
Main	Influenced by Arabic	Fire	145	Noun	3.708	-0.494	
Main	Influenced by Arabic	Good/goodness	148	Noun	3.800	-0.357	
Main	Influenced by Arabic	Grandeur	1	Iconic	4.192	0.230	
Main	Influenced by Arabic	Grave error	38	Iconic	4.231	0.287	
Main	Influenced by Arabic	Hand	120	Noun	3.000	-1.555	
Main	Influenced by Arabic	Hardship	19	Iconic	4.440	0.601	
Main	Influenced by Arabic	He believed	537	Verb	4.000	-0.058	
Main	Influenced by Arabic	He brought	264	Verb	3.720	-0.477	
Main	Influenced by Arabic	He called	170	Verb	3.320	-1.076	
Main	Influenced by Arabic	He came	278	Verb	3.840	-0.297	
Main	Influenced by Arabic	He covered	289	Verb	4.885	1.266	
Main	Influenced by Arabic	He created	184	Verb	4.160	0.182	
Main	Influenced by Arabic	He dispersed	5	Iconic	4.125	0.129	
Main	Influenced by Arabic	He feared	40	Phonaestheme	4.360	0.481	
Main	Influenced by Arabic	He followed	136	Verb	2.960	-1.614	
Main	Influenced by Arabic	He gave	271	Verb	3.760	-0.417	
Main	Influenced by Arabic	He intended	139	Verb	3.240	-1.195	
Main	Influenced by Arabic	He lied	176	Verb	3.600	-0.657	
Main	Influenced by Arabic	He made	340	Verb	3.077	-1.439	
Main	Influenced by Arabic	He perished	5	Phonaestheme	3.360	-1.016	
Main	Influenced by Arabic	He revealed/sent down	183	Verb	4.125	0.129	
Main	Influenced by Arabic	He said	1618	Verb	3.708	-0.494	
Main	Influenced by Arabic	He saw	271	Verb	3.208	-1.243	
Main	Influenced by Arabic	He sent	130	Verb	3.923	-0.173	

Main	Influenced by Arabic	He spread/expand something	1	Iconic	4.240	0.301
Main	Influenced by Arabic	He suppresses them	3	Phonaestheme	3.280	-1.136
Main	Influenced by Arabic	He took	127	Verb	3.346	-1.036
Main	Influenced by Arabic	He touched	56	Iconic	3.720	-0.477
Main	Influenced by Arabic	He was God-conscious	166	Verb	3.560	-0.716
Main	Influenced by Arabic	He wished	236	Verb	4.038	0.000
Main	Influenced by Arabic	He worked/did	276	Verb	3.240	-1.195
Main	Influenced by Arabic	Heart	132	Noun	4.200	0.241
Main	Influenced by Arabic	Heat	3	Phonaestheme	5.269	1.842
Main	Influenced by Arabic	Humanity	241	Noun	3.875	-0.245
Main	Influenced by Arabic	Humiliation	4	Iconic	4.240	0.301
Main	Influenced by Arabic	Iron	6	Iconic	3.320	-1.076
Main	Influenced by Arabic	Large	32	Adjective	4.083	0.067
Main	Influenced by Arabic	Little (in quantity)	27	Adjective	4.125	0.129
Main	Influenced by Arabic	Lord	975	Noun	4.826	1.178
Main	Influenced by Arabic	Noble	28	Adjective	4.962	1.381
Main	Influenced by Arabic	One worthy of worship	147	Noun	4.280	0.361
Main	Influenced by Arabic	Other	144	Noun	3.692	-0.518
Main	Influenced by Arabic	Painful	72	Adjective	2.769	-1.900
Main	Influenced by Arabic	Path	45	Iconic	3.917	-0.183
Main	Influenced by Arabic	People/Nation	383	Noun	4.200	0.241
Main	Influenced by Arabic	Perversity	1	Iconic	2.846	-1.785
Main	Influenced by Arabic	Portion	1	Phonaestheme	2.880	-1.734
Main	Influenced by Arabic	Rage	6	Iconic	4.417	0.566
Main	Influenced by Arabic	Repel	2	Phonaestheme	4.560	0.780
Main	Influenced by Arabic	Returned	36	Phonaestheme	4.769	1.093
Main	Influenced by Arabic	Ridicule	11	Phonaestheme	3.609	-0.644
Main	Influenced by Arabic	Riding	1	Phonaestheme	3.792	-0.370
Main	Influenced by Arabic	She closed	1	Phonaestheme	3.800	-0.357
Main	Influenced by Arabic	Shook	1	Phonaestheme	3.591	-0.670
Main	Influenced by Arabic	Sign	382	Noun	4.115	0.115
Main	Influenced by Arabic	Sky	310	Noun	4.720	1.020
Main	Influenced by Arabic	Slave	131	Noun	3.667	-0.557
Main	Influenced by Arabic	Something	283	Noun	4.360	0.481

Main	Influenced by Arabic	Stable abode	9	Iconic	2.846	-1.785	
Main	Influenced by Arabic	Stern	36	Adjective	5.040	1.499	
Main	Influenced by Arabic	Stormy	2	Phonaestheme	4.000	-0.058	
Main	Influenced by Arabic	Swallow	1	Phonaestheme	3.875	-0.245	
Main	Influenced by Arabic	The All-Knowing	101	Adjective	5.240	1.798	
Main	Influenced by Arabic	The earthquake	4	Iconic	4.040	0.002	
Main	Influenced by Arabic	The Giver of Serenity	1	Adjective	5.160	1.678	
Main	Influenced by Arabic	The Great	104	Adjective	5.042	1.501	
Main	Influenced by Arabic	The lowest level	74	Adjective	4.077	0.057	
		The More/Most					
Main	Influenced by Arabic	Knowledgeable	16	Adjective	4.731	1.036	
Main	Influenced by Arabic	The Most Merciful	112	Adjective	4.625	0.877	
Main	Influenced by Arabic	The Most Mighty	101	Adjective	4.840	1.199	
Main	Influenced by Arabic	The Most Wise	84	Adjective	5.000	1.439	
Main	Influenced by Arabic	The self/soul	295	Noun	4.792	1.127	
		They (were)					
Main	Influenced by Arabic	drowned	17	Iconic	3.720	-0.477	
Main	Influenced by Arabic	They cut	29	Phonaestheme	5.462	2.129	
Main	Influenced by Arabic	They gathered	22	Phonaestheme	4.040	0.002	
Main	Influenced by Arabic	They went forth	5	Phonaestheme	3.720	-0.477	
Main	Influenced by Arabic	They went out	53	Phonaestheme	4.040	0.002	
Main	Influenced by Arabic	Thunder	2	Iconic	5.417	2.062	
Main	Influenced by Arabic	To screech/croak	1	Iconic	2.826	-1.815	
Main	Influenced by Arabic	Tranquility	6	Iconic	5.120	1.618	
Main	Influenced by Arabic	Truth	242	Noun	5.080	1.558	
Main	Influenced by Arabic	Virtuous/Pious	5	Adjective	4.955	1.371	
Main	Influenced by Arabic	Was	1358	Verb	2.920	-1.674	
Main	Influenced by Arabic	Way	176	Noun	3.120	-1.375	
Main	Influenced by Arabic	We shattered	1	Iconic	3.458	-0.869	
Main	Influenced by Arabic	You slipped	2	Phonaestheme	3.885	-0.231	
Pilot	English/European	A lot	21	Adjective	2.654	0.604	
Pilot	English/European	A shaking	1	Phonaestheme	2.154	-0.192	
Pilot	English/European	A spread	1	Iconic	1.846	-0.681	
Pilot	English/European	All-Hearing	8	Adjective	1.962	-0.498	
Pilot	English/European	All-seeing	20	Adjective	2.538	0.420	
Pilot	English/European	Body	4	Phonaestheme	1.538	-1.171	
Pilot	English/European	Book	260	Noun	1.923	-0.559	

Pilot	English/European	Clear/transparent	119	Adjective	2.115	-0.253	
Pilot	English/European	Command	166	Noun	2.923	1.032	
Pilot	English/European	Constantly forgiving	29	Adjective	2.231	-0.069	
Pilot	English/European	Criminals	8	Adjective	2.577	0.482	
Pilot	English/European	Earth	461	Noun	2.808	0.849	
Pilot	English/European	Easy	3	Iconic	2.346	0.114	
Pilot	English/European	Family	127	Noun	1.962	-0.498	
Pilot	English/European	Fire	145	Noun	1.769	-0.804	
Pilot	English/European	Good/goodness	148	Noun	2.231	-0.069	
Pilot	English/European	Grandeur	1	Iconic	2.885	0.971	
Pilot	English/European	Grave error	38	Iconic	2.500	0.359	
Pilot	English/European	Hand	120	Noun	1.308	-1.538	
Pilot	English/European	Hardship	19	Iconic	2.846	0.910	
Pilot	English/European	He believed	537	Verb	1.769	-0.804	
Pilot	English/European	He brought	264	Verb	1.577	-1.110	
Pilot	English/European	He called	170	Verb	1.462	-1.293	
Pilot	English/European	He came	278	Verb	2.154	-0.192	
Pilot	English/European	He covered	289	Verb	4.346	3.297	
Pilot	English/European	He created	184	Verb	1.577	-1.110	
Pilot	English/European	He dispersed	5	Iconic	2.154	-0.192	
Pilot	English/European	He feared	40	Phonaestheme	2.154	-0.192	
Pilot	English/European	He followed	136	Verb	1.538	-1.171	
Pilot	English/European	He gave	271	Verb	2.115	-0.253	
Pilot	English/European	He intended	139	Verb	1.692	-0.926	
Pilot	English/European	He lied	176	Verb	1.423	-1.354	
Pilot	English/European	He made	340	Verb	1.462	-1.293	
Pilot	English/European	He perished	5	Phonaestheme	2.115	-0.253	
		He revealed/sent					
Pilot	English/European	down	183	Verb	2.500	0.359	
Pilot	English/European	He said	1618	Verb	2.269	-0.008	
Pilot	English/European	He saw	271	Verb	1.654	-0.987	
Pilot	English/European	He sent	130	Verb	2.231	-0.069	
		He spread/expanded					
Pilot	English/European	something	1	Iconic	2.769	0.788	
Pilot	English/European	He suppresses them	3	Phonaestheme	2.077	-0.314	
Pilot	English/European	He took	127	Verb	1.654	-0.987	
Pilot	English/European	He touched	56	Iconic	1.731	-0.865	

		He was					
Pilot	English/European	God-conscious	166	Verb	1.923	-0.559	
Pilot	English/European	He wished	236	Verb	2.615	0.543	
Pilot	English/European	He worked/did	276	Verb	1.577	-1.110	
Pilot	English/European	Heart	132	Noun	2.115	-0.253	
Pilot	English/European	Heat	3	Phonaestheme	2.769	0.788	
Pilot	English/European	Humanity	241	Noun	2.154	-0.192	
Pilot	English/European	Humiliation	4	Iconic	2.923	1.032	
Pilot	English/European	Iron	6	Iconic	1.654	-0.987	
Pilot	English/European	Large	32	Adjective	2.769	0.788	
Pilot	English/European	Little (in quantity)	27	Adjective	3.808	2.440	
Pilot	English/European	Lord	975	Noun	2.231	-0.069	
Pilot	English/European	Noble	28	Adjective	2.077	-0.314	
		One worthy of					
Pilot	English/European	worship	147	Noun	2.269	-0.008	
Pilot	English/European	Other	144	Noun	1.577	-1.110	
Pilot	English/European	Painful	72	Adjective	2.308	0.053	
Pilot	English/European	Path	45	Iconic	1.769	-0.804	
Pilot	English/European	People/Nation	383	Noun	2.269	-0.008	
Pilot	English/European	Perversity	1	Iconic	1.615	-1.048	
Pilot	English/European	Portion	1	Phonaestheme	1.615	-1.048	
Pilot	English/European	Rage	6	Iconic	4.154	2.991	
Pilot	English/European	Repel	2	Phonaestheme	2.538	0.420	
Pilot	English/European	Returned	36	Phonaestheme	3.808	2.440	
Pilot	English/European	Ridicule	11	Phonaestheme	2.654	0.604	
Pilot	English/European	Riding	1	Phonaestheme	2.731	0.726	
Pilot	English/European	She closed	1	Phonaestheme	1.885	-0.620	
Pilot	English/European	Shook	1	Phonaestheme	2.346	0.114	
Pilot	English/European	Sign	382	Noun	1.769	-0.804	
Pilot	English/European	Sky	310	Noun	2.115	-0.253	
Pilot	English/European	Slave	131	Noun	1.731	-0.865	
Pilot	English/European	Something	283	Noun	2.692	0.665	
Pilot	English/European	Stable abode	9	Iconic	1.538	-1.171	
Pilot	English/European	Stern	36	Adjective	2.346	0.114	
Pilot	English/European	Stormy	2	Phonaestheme	3.077	1.277	
Pilot	English/European	Swallow	1	Phonaestheme	2.654	0.604	
Pilot	English/European	The All-Knowing	101	Adjective	2.769	0.788	

Pilot	English/European	The earthquake	4	Iconic	2.962	1.094	
Pilot	English/European	The Giver of Serenity	1	Adjective	2.538	0.420	
Pilot	English/European	The Great	104	Adjective	3.115	1.338	
Pilot	English/European	The lowest level	74	Adjective	2.500	0.359	
Pilot	English/European	The More/Most Knowledgeable	16	Adjective	2.308	0.053	
Pilot	English/European	The Most Merciful	112	Adjective	2.154	-0.192	
Pilot	English/European	The Most Mighty	101	Adjective	2.654	0.604	
Pilot	English/European	The Most Wise	84	Adjective	2.000	-0.436	
Pilot	English/European	The self/soul	295	Noun	2.962	1.094	
Pilot	English/European	They (were) drowned	17	Iconic	2.346	0.114	
Pilot	English/European	They cut	29	Phonaestheme	2.769	0.788	
Pilot	English/European	They gathered	22	Phonaestheme	2.038	-0.375	
Pilot	English/European	They went forth	5	Phonaestheme	2.000	-0.436	
Pilot	English/European	They went out	53	Phonaestheme	1.462	-1.293	
Pilot	English/European	Thunder	2	Iconic	4.115	2.930	
Pilot	English/European	To screech/croak	1	Iconic	2.846	0.910	
Pilot	English/European	Tranquility	6	Iconic	3.423	1.828	
Pilot	English/European	Truth	242	Noun	1.692	-0.926	
Pilot	English/European	Virtuous/Pious	5	Adjective	2.192	-0.130	
Pilot	English/European	Was	1358	Verb	1.308	-1.538	
Pilot	English/European	Way	176	Noun	1.615	-1.048	
Pilot	English/European	We shattered	1	Iconic	1.615	-1.048	
Pilot	English/European	You slipped	2	Phonaestheme	2.423	0.237	