Undergraduate Linguistics Association of Britain
Proceedings of ULAB IX
Queen Mary University of London, 11–13 April 2019

Dissertation

Is arbitrariness a design-feature of the sign?

T. R. Williamson, Lancaster University

Proceedings of ULAB IX, pp. 228–259.

ULAB website: https://www.ulab.org.uk/conferences/presentations/411
DOI: http://dx.doi.org/10.5282/ulab2019.411

Abstract

Throughout the history of linguistics, there has been a tendency to believe that there is no relationship between the form of linguistic signs and their meanings; in other words, that their relationship is *arbitrary*. This view was specifically popularised by de Saussure (1916), although it has been sustained in the philosophy of semiotics since Aristotle, and was supposedly cemented by Hockett (1960) in his *Origins of Speech*, calling 'arbitrariness' the eighth of thirteen 'design-features' of language. While recent trends in the study of nonarbitrariness have set out to overthrow the Saussurean precedent, this paper aims suggest that, in fact, arbitrariness is not a design-feature of the sign. Starting from the beliefs of Cratylus in Plato's *Cratylus*, a philosophical, nonarbitrary language (called *Nonarbitrer*) is constructed to test whether there could be a language that had the 'design-feature' of nonarbitrariness, or *iconicity*, such that the language might function just as any other natural one. By measuring the accuracy and time taken for 33 participants in a memory recall task for lexical items in three 'Levels' of Nonarbitrer, alternating in Level by degree of iconicity (compared with analogous data from Mandarin and Basque, selected for their genetic and orthographic resemblances with, or not with, English) it is found that Nonarbitrer *could* be considered functional, and that, therefore, Hockett (1960)'s position should be reconsidered.

Is arbitrariness a design-feature of the sign?

T. R. Williamson
Lancaster University

Abstract. Throughout the history of linguistics, there has been a tendency to believe that there is no relationship between the form of linguistic signs and their meanings; in other words, that their relationship is *arbitrary*. This view was specifically popularised by de Saussure (1916), although it has been sustained in the philosophy of semiotics since Aristotle, and was supposedly cemented by Hockett (1960) in his *Origins of Speech*, calling 'arbitrariness' the eighth of thirteen 'design-features' of language. While recent trends in the study of nonarbitrariness have set out to overthrow the Saussurean precedent, this paper aims suggest that, in fact, arbitrariness is not a design-feature of the sign. Starting from the beliefs of Cratylus in Plato's *Cratylus*, a philosophical, nonarbitrary language (called *Nonarbitrer*) is constructed to test whether there could be a language that had the 'design-feature' of nonarbitrariness, or *iconicity*, such that the language might function just as any other natural one. By measuring the accuracy and time taken for 33 participants in a memory recall task for lexical items in three 'Levels' of Nonarbitrer, alternating in Level by degree of iconicity (compared with analogous data from Mandarin and Basque, selected for their genetic and orthographic resemblances with, or not with, English) it is found that Nonarbitrer *could* be considered functional, and that, therefore, Hockett (1960)'s position should be reconsidered.

1 Introduction

This paper argues that the nature of the linguistic sign is not necessarily arbitrary; that there is no necessary disconnect between form and meaning in language. This is done by constructing one philosophical language whose signs are designed to be as nonarbitrary as possible, and then two further, more nonarbitrary, 'Levels' of that language. To introduce the fundamental topics at hand, the precedent for the view that the sign is arbitrary is discussed. Then, an account of the most noteworthy attempt at a philosophical language in the past is given. Following these initial remarks, the aims and outline of the paper are given.

1.1 History of the philosophy of semiotics

Although studies into the linguistic sign have taken off significantly in the last century, the field of semiotics (which studies 'signs' generally, although often including the language as a focal point) has been the object of much thought for thousands of years. This goes all the way back to Plato and Aristotle.

In Plato's *Cratylus*, Socrates and his companions discuss the notion of a 'naturalness of names', arguing on one side (Cratylus') that there is some higher reason for the way words are formed such that individual characters or letters in language actually represent particular essences of the objects they depict. It is also argued that there was some original 'creator' of language. In the debate, the character Homogenes takes the opposite view, with Socrates mediating. After Plato, Aristotle takes the opposing position to Cratylus in his *De Interpretatione*. He argues that it is convention, and not any sort of naturality or creation, that establishes meaning for signs. It is this idea, that meaning is disconnected from form, that would establish the tradition of the philosophies of semiotics and linguistics for millennia to come.

Throughout the next 2000 years, up to the 19th century, a plethora of philosophers attempted to identify the nature of the sign. St Augustine (354-430), Roger Bacon (1267) and even Thomas Reid (1764) all give an account of the nature of the linguistic sign. All of them follow the Aristotelian precedent set before them. And furthermore, in a history of the field, they all act as precursors to the

main founding father of semiotics: Ferdinand de Saussure. The detail of Saussurean semiotic theory will be discussed in 2.2. below.

1.2 Wilkins (1668)'s *Philosophical Language*

In this paper, a philosophical language is constructed and compared with natural languages to ascertain its similarity to them. To introduce what a philosophical language is, the work of John Wilkins will be briefly discussed.

The idea of creating a language for a specific purpose, one that is deemed to be *philosophical* rather than just artificial, has existed for hundreds of years. The most noteworthy attempt has been by Wilkins. In 1668, he published *An Essay Towards a Real Character, and a Philosophical Language* – wanting to meet various cries for social and religious communicative change, he put forward an attempt at a universal, philosophical language. He reasoned that, 'if men should generally consent upon the same way or manner of *Expression*, as they do agree on the same *Notion*, we should then be freed from the Curse in the Confusion of Tongues' (Wilkins, 1668, p. 20); in other words, assuming the concepts we have are universal (that we all perceive things the same way), a language whose structure picked out concepts, and not one whose words denoted or referred to them, would allow for communication between people of entirely different languages.

To do this, Wilkins designates the majority of his efforts towards placing all 'things, notions, characteristics and ideas' within a hierarchical taxonomic structure. Over half of the 454-page *Essay* is devoted to complex tables that place these in relation to one another and on one of three levels of a hierarchy: Genus, Species and Difference. This enormous endeavour, however, fails – in part because of its complexity, but mainly for others' failure to adopt it (Thomas, 2011). It is important for this paper to acknowledge Wilkins not only due to his failure, but also given the importance for the systematic approach he takes in constructing his language – such an approach will be used here too.

1.3 Aims

The aim of this dissertation is to provide an answer to the question: could Cratylus have been right? In other words, could the conception of language as having some natural link between form and meaning ever be realised? To answer this, the precedent set in the history of linguistics, and especially that set by de Saussure (1916) and Hockett (1960), must be cast into doubt.

Along with these primary aims, it will be the focus of this paper to provide corroborating evidence for contemporary claims made in the study of iconicity, as well as to provide contrary answers to specific problems posed about the nature of iconicity in Haiman (2008): 'iconicity seems at present to offer no proven cognitive benefits' and Dingemanse et al. (2015): 'a perfectly iconic language could only serve a subset of our communicative goals, and may limit the power of language to abstract'.

A final aim is to confront the challenges posed by the use of a philosophical language in the laboratory, and to ascertain whether one can say of philosophical/artificial languages that they might be able to provide reliable data under test conditions – in other words, whether a philosophical language could be *functional*.

1.4 Outline

This paper is split into six sections. Following this first, introductory section, a literature review follows. In this, due to their great importance within the theory of this paper, the works of Hockett (1960) and de Saussure (1916) are deconstructed at length. Following this, an overview of the field of iconicity is given in 2.3. As the study of iconicity mostly pertains to sound symbolism, this is the focus of the

discussion (2.3.1.), although the smaller areas pertaining to systematicity and morphology in iconicity are included.

In section 3, the methodology for this is detailed, which will describe an attempt at creating a philosophical language, along with detailing the design of the experiment itself. Section 4 elaborates on the results, and section 5 discusses them in more detail. The final section contains this paper's conclusions and proposes areas for improvement.

2 Literature review

To start, it is useful to outline the issues with which this paper contends. In the history of linguistics, there has been a significant precedent in favour of viewing the linguistic sign as arbitrary. As explained above, work done in semiotics starting from Aristotle all take that the relationship the sign has with what it means is arbitrary. The precedent for this has been set by two key figures: Charles Hockett and Ferdinand de Saussure. Their work is discussed in detail. Following this, more contemporary approaches countering such a precedent are put forward.

2.1 Hockett (1960)'s design-features

This dissertation mostly argues against 'The Origin of Speech' (1960), by Charles F. Hockett. In it, he discusses the merits and failings of a comparative method in linguistics for trying to understand the 'origin of language'. Hockett finds fault with this style of comparison, claiming that it could not encapsulate the features of *all* languages, just human ones – leaving out the languages of other animals, he says, will fail at finding their overall shared origin. He proposes that a comparative method in line with a zoological approach would help to solve this problem.

For this, Hockett finds that a new set of attributes need to be provided. His response is to provide a list of features of the designs of communicative systems, called 'design-features', that he claims can be found in every single communicative system. They are supposed to be analogous to the idea of 'necessary properties' for the existence of, rather than classification of, a communicative system. Of the thirteen design-features Hockett presents, this paper will take issue with the eighth: *arbitrariness*. Hockett says:

> '*In a semantic communicative system the ties between meaningful message elements and their meanings can be arbitrary or nonarbitrary. In language the ties are arbitrary. The word "salt" is not salty nor granular; "dog" is not "canine"; "whale" is a small word for a large object; "microorganism" is the reverse. A picture, on the other hand, looks like what it is a picture of. A bee dances faster if the source of nectar she is reporting is closer, and slower if it is farther away. The design-feature of "arbitrariness" has the disadvantage of being arbitrary, but the great advantage that there is no limit to what can be communicated about.*' (*ibid.*, p. 90)

Moving past his dismissal of pictographic scripts, it is a failure of Hockett's that he considers arbitrariness one of his necessary conditions, or design-features, of language. It is one of the purposes of this paper to argue that *arbitrariness* should not have been called a 'design-feature'.

2.2 The arbitrariness of the sign

The second influential work with which this paper finds fault is the *Course in General Linguistics* (1916), by Ferdinand de Saussure. In it, he reduces 'the sign' to two main components: the *signifier* and the *signified*. These are sometimes called, in-line with the original publishing language (French), the *signifant* and *signifié* respectively (de Saussure, 1916, p. 78). Strictly speaking, de Saussure would say

the former of these is a 'sound pattern', thus specifically concerning the result of speech, and the latter a 'concept'. To him, a 'sound pattern' is the psychological impression on a hearer that a sound (a linguistic vocalisation) makes, and a concept is whatever it is that the sound pattern attempts to represent (*ibid.*, p. 77). On the relationship between the signifier and the signified, and for which de Saussure is more famous, the central claim is that there is no meaningful link between the two – that the sign is arbitrary (*ibid.*, p. 78).

Furthermore, and more pertinent to this paper itself, is a claim made concerning the nature and result of arbitrariness. According to de Saussure, 'signs which are entirely arbitrary convey better than others the ideal semiological process [i.e. being meaningful]. That is why the most complex and the most widespread of all systems of expression, which is the one we find in human languages, is also the most characteristic of all' (*ibid.*, p. 79). In other words, it is central to de Saussure's philosophy that there is something about arbitrariness that makes it more efficient for the communication of meaning, and it is because of this inherent efficiency that the linguistic sign across the world's languages tends to be arbitrary.

To address potential critics, de Saussure brings forward two objections to his philosophy in the *Course*. In the first, onomatopoeic words are discussed. As words whose very forms are supposed to represent part of their meaning, they would seem to undermine de Saussure's arbitrariness. Indeed, his response to this is quite ineffectual – he first suggests that onomatopoeia is not an 'organic element' (*ibid.*, p. 80) of language, as if their artificiality (like they have been specifically "made-up") somehow undermines their credibility or veracity as part a of language. Moreover, he also suggests that their non-onomatopoeic etymology would indicate their arbitrariness, committing a fallacy of etymology (that historical meaning should dictate present meaning of lexical items) in such an appeal. To his credit, his reference to cross-linguistic differences in similar onomatopoeic terms (for example, *ouaoua* in French and *wauwau* in German (*ibid.*, p. 80) to signify the noise a dog makes) is convincing, as is his suggestion that exclamatory phrases (for example, *Oh!* in English) are wrongly mislabelled as somehow, in their spontaneity and exuberant expression, mirroring their nature as exclamatory.

Looking especially toward de Saussure, it is clear that arbitrariness has been firmly established as the theoretical precedent within linguistics, and specifically within semiotics. It has only been in the very contemporary literature that attempts to overturn this precedent have occurred.

2.3 Studies in iconicity

More recently, studies have taken the view that the linguistic sign is nonarbitrary. This has expanded into experimental research using corpora, phonetics and may other tools now available to linguists. In the literature, the term 'nonarbitrary' is left aside, and 'iconicity' is used instead. As indicated by Croft (2003), 'the intuition behind iconicity is that the structure of language reflects in some way the structure of experience' (*ibid.*). More broadly, however, the term 'iconicity' should be understood as 'the resemblance-based mapping between aspects of form and meaning' (Dingemanse et al., 2015). Although this paper is specifically concerned with the possibilities for iconic form-meaning mappings in orthography or morphology, the vast majority of studies into nonarbitrariness have been concerned with phonetics and phonology. Because of this, a review of the literature ought to focus on their findings, although some studies into morphological iconicity are also discussed here.

2.3.1 Sound Symbolism

Many have given attempts to classify the nature and types of sound symbolism. Von Humbolt (1836)'s three distinctions, direct imitation (e.g. onomatopoeia), symbolic designation (e.g. a loose understanding of that for which Cratylus argues in Plato's Cratylus, see 1.1.) and analogical designation

(e.g. systematicity, see below) are the first. Reference to Gasser et al. (2010)'s classifications of absolute and relative iconicity is also useful, which concern exactly how much of a relationship between form and meaning one can say there is – an absolute sound symbolic word would be one of Von Humbolt's direct imitations, whereas a relative one would be exemplified with systematicity (see 2.3.2).

According to Lockwood & Dingemanse (2015), a word that one can (broadly – see also phonaesthemes below) call sound-symbolic can be referred to as an ideophone. Blasi et al. (2016) define an ideophone as a word that seeks to 'convey a communicative function (or meaning) through the depiction of sensory imagery' (*ibid.*), a concept with which English speakers might be most familiar by reference to onomatopoeia – of which in English there are reportedly over a hundred (Rhodes, 1994). The focus in the study of sound symbolism concerns exactly what concepts ideophones can convey in their form – results of these studies will now be discussed.

This notion of sensory information being communicated from Blasi et al. (2016) is important for studying ideophones. The most classic example of this is the 'kiki-bouba' paradigm, as explained in Lockwood & Dingemanse (2015):

> '[In] *Köhler (1947), participants see two shapes – one spiky and one round – and two non-words takete and maluma* [later adapted to kiki and bouba by Ramachandran and Hubbard (2001)]. *Participants are then asked to say which non-word goes with which shape. Participants generally map the round shape with the "round" non-words (maluma/bouba) and the spiky shape with the "spiky" word (takete/kiki).*' (*ibid.*, p. 3)

In this forced-choice experiment, participants effectively match auditory information with tactile information, linking "spikiness" or "roundness" (i.e. of letters) with whichever word they feel best corresponds. Despite the fact there are not many options for participants, and the oddity of being asked to correspond two such distinct phenomena (the tactile and the auditory), Lockwood & Dingemanse (2015) are right to point out that the effect 'appears to be strong and consistent' (*ibid.*, p. 3). There are more correspondences than auditory and tactile, though; another example is between sound clustering and perceptions of motion and speed (Cuskley, 2013), and with gustatory perception (Simner, Cuskley, & Kirby, 2010; Gallace, Boschin, & Spence, 2011; Ngo, Misra, & Spence, 2011; Crisinel et al., 2012).

As well as there being evidence that ideophones can create a form to sensory meaning relationship, Winter et al. (2017) show that, in English, ideophones do this the best out of any other sort of word. Their findings demonstrated that 'words that refer to perceptual content ([with] higher sensory experience ratings) were particularly high in iconicity' (*ibid.*, p. 19). They further show that there is a certain preference for the denotation of specific sensory experiences within ideophones, claiming that 'those that denote auditory and tactile meanings were particularly high in iconicity compared to those denoting visual, olfactory and gustatory meanings' (*ibid.*). This seems not only to corroborate the findings of the kiki-bouba paradigm, and related studies (e.g. Ramachandran & Hubbard, 2001, as cited by Lockwood & Dingemanse, 2015), but also suggests that there is some sort of innate preference for the expression of these senses – that ideophones prefer, at least in English, auditory and tactile meanings.

However, ideophones can go a lot further than communicating sensory perception in the vividness of what they express. For instance, in Siwu (spoken by the Mawu people in eastern Ghana), ideophones express the concept of repetition with reduplication (e.g. wùrùfùù and wùrùfù-wùrùfù, meaning 'fluffy' and 'fluffy here and there') or mass with voiced consonants (e.g. tsratsra and dzradzra, meaning 'a light person walking fast' and 'a heavy person walking fast') – see Dingemanse (2011). Examples of such ideophone vividness can also be found in Japanese, Ewe and Tamil, and are listed in Dingemanse et al. (2015). It is noteworthy that none of these are Indo-European languages – Vigliocco, Perniss & Vinson (2014) point out that biases for arbitrariness, such as de Saussure's mentioned in 2.2., may be due to

Indo-European's relative lack of iconicity, and especially ideophones, in comparison with the rest of the world's languages.

In fact, ideophones have been said to convey a plethora of different concepts. Winter et al. (2017, p. 4), citing Dingemanse (2012), list: 'animate and inanimate sounds, luminance, manner of movement, size, texture, shape, taste, temperature, and emotional and psychological states'. Dingemanse (2012) also proposes a hierarchy of probability regarding the likelihood of various concepts' encodability into ideophones: 'sound < movement < visual patterns < other sensory perceptions < inner feelings and cognitive states', where 'sound-to-sound mappings (onomatopoeia) should be the most common, followed by sound-to-movement mappings, followed by mappings to other, non-motion visual patterns and so on' (Winter et al., 2017, p. 5).

One criticism of the literature at this stage might be to say that the sample sizes, stimuli (e.g. in Köhler (1947)'s forced-choice test, in the limited amount of options available to participants) or languages in question do not cover a broad enough scope for their data to be cross-linguistically applicable. Thankfully, Blasi et al. (2016) resolve this. They used various corpora and other databases of '62% of the world's languages and about 85% of its lineages' (*ibid.*) to collect 6,452 distinct lists of words with which to compare a set 100-word list of 'basic vocabulary items', and found that 74 out the 100 had strong, cross-linguistic tendencies towards either containing or avoiding various phonemes (called positive or negative sound-meaning associations). In other words, it seems that even at the most preliminary level, the languages of the world are biased towards carrying certain sounds in relation to certain concepts.

2.3.2 Systematicity

Closely related to the concept of sound symbolism is systematicity. Although also concerning the form-meaning relationship with sound, systematicity is defined by Dingemanse et al. (2015, p. 606) as 'a statistical relationship between the patterns of sound for a group of words and their usage', a definition to which Monaghan et al. (2014, p. 1) would add … 'though these may not be restricted to imitative forms' (such as in Gasser et al. (2010)'s relative iconicity).

A useful point of note is whether systematic words should be separated from sound-symbolic ones. Haspelmath (2008) believes they should be, suggesting that a large part of what had previously been considered iconic was actually studied as such due to 'asymmetries of frequency of occurrence' (*ibid.*). Haiman (2008) defends the place of systematicity in iconicity, suggesting that statistical correlation should be accepted as a part of what is considered iconic. This statistical correlation is what now defines systematicity.

One key example of systematicity in iconicity, and in fact one key piece of supporting evidence for Haspelmath (2008), is the phonaestheme. Defined as 'frequently recurring sound-meaning pairings that are not clearly contrastive morphemes' (Firth, 1930; Bergen, 2004, p. 290), and as 'phonemes or phoneme clusters that frequently correspond to particular meanings' (Winter et al., 2017, p. 6), they have a significant history in the study of linguistics. Analysed by both Wallis (1699) and Bloomfield (1933), two prominent examples are the clusters gl- and sn-; relating in their frequent incidence to 'vision' or 'light' and 'nose' or 'mouth' respectively (Bergen, 2004). Examples of each might be glimmer, glisten, gleam and glow; or snore, snout, snarl and sneeze (*ibid.*, p. 290).

Furthermore, they are deemed to have great psychological significance. As Bergen (2004) concludes: 'Like other noncategorical pairings between phonology and semantics, phonaesthemes have a significant psychological status. Specifically, when a form meaning pairing recurs sufficiently often, it comes to take on priming behavior that cannot be explained as the result of form or meaning priming, alone or in combination' and that 'phonaesthemes are a testament to the diligence of the human ability to encode and use subtle statistical associations in the linguistic environment.' (*ibid.*, p. 307)

2.3.3 Morphological trends

In response to Haspelmath (2008), Haiman (2008) also cites various other conceptions of iconicity that move away from sound symbolism and systematicity, to position it firmly away from his hypotheses about asymmetrical frequency. They concern, instead, how various cross-linguistic morphological tendencies convey iconicity.

One example Haiman (2008) gives is honorific agreement in alienable possession relative to inalienable possession. Of alienability as a whole, Haiman says: 'typically, though not always, the expression of alienable possession is more complex, with greater linguistic distance between possessor and possessum, than that of inalienable possession and this seems to reflect conceptualization iconically' (*ibid.*, p. 37). This would immediately seem to corroborate Haspelmath (2008)'s hypotheses as discussed above, considering Haiman (2008)'s concession that inalienable possession is more frequently communicated. However, Haiman provides Korean as a counterexample. In Korean honorific agreement, a desire to be polite, or to give more respect, is iconically paralleled in the inclusion of an extra particle. This is exemplified in Sohn (1994):

a. sensayng-nim-uy phali khu-sey-yo
teacher-HON-GEN arm big-HON-POL
'The teacher's arms are big.' (arms are inalienably part of the teacher)

b. sensayng-nim-uy ankyengi khu-(sey)-yo
teacher-HON-GEN glasses big-(HON)-POL
'The teacher's glasses are big.' (glasses are less likely to bask in the teacher's reflected honour and glory) (Sohn, 1994, p. 176)

As can be seen from the glossed examples, the HON particle (signifying a desire to be further respectful, along with the POL particle that is essential in the context of talking about one's teacher) is deemed necessary in the first example when the possessum is more inalienable, as an arm, where in the second, it is only optional (indicated with parentheses).

Further, Haiman (2008) provides evidence from observation and reconstruction of language evolution to back up his claim that 'more form is more meaning' (*ibid.*, p. 42). Citing Haiman (2003), he explains that there was an introduction to verbs of a nominalising suffix in Romanian (observed) and a nominalising infix in Khmer (reconstructed), which were reassigned phonemes already existing in their respective languages. This addition of a phoneme, Haiman (2008) argues, parallels the notion that there has been an 'addition' of meaning (the nominalisation), and thus supports another understanding of iconicity as, in part, morphological.

2.4 Experimental hypotheses

Following a review of the literature, especially noting Hockett and de Saussure, this paper attempts to show that arbitrariness should not be considered a design-feature of the sign. To do this, a philosophical, nonarbitrary language is created and tested to assess whether such a language could function like a natural language.

It is first hypothesised that this philosophical language will function just like any other; that it will be *functional*. The notion of functionality will be defined in 3.2.1. To experimentally isolate nonarbitrariness, two further 'Levels' of the constructed language will be created. In this way, Level 1 will be designed to be the most nonarbitrary, Level 2 will be more arbitrary than Level 1, and Level 3 will be more arbitrary than Level 2. In light of these Levels, it is hypothesised that, contrary to Dingemanse et al. (2015) and supporting claims made by Givón (1985) and Dressler et al. (1987), the

most nonarbitrary Level (Level 1) will not pose significant problems for participants in a memory task. Further, it is hypothesised that as arbitrariness increases, participants' performance will decrease – that Level 3 will see the worst performance and Level 2 will be between Level 1 and Level 3.

In ascertaining functionality with regard to natural languages, participants were asked to do identical memory tasks from the ones given to them for the philosophical language to one of two possible natural languages: Mandarin and Basque. It is hypothesised here that participants will perform better in the memory task for Level 1 of the constructed language than either of the natural languages. A final hypothesis concerning functionality is that the most nonarbitrary Level will be most functional, and the most arbitrary Level will be the least functional.

3 Methodology

To test whether nonarbitrariness could be a 'design-feature' of a language, a philosophical language was constructed. It was called *Nonarbitrer*. A brief outline of the language's orthography, morphology, word classes and syntax are given here. Then, a discussion of the design of the experiments, the participants, and materials used follow. Given the various constraints on the researcher, no phonology for the language was constructed.

3.1 *Nonarbitrer*

3.1.1 Orthography

As an attempt to make signs as nonarbitrary as possible, Nonarbitrer was created to mimic the conception of language expressed by Cratylus (see 1.1.), in which the forms of signs have some natural connection with what they mean. This mimicking was achieved by mapping perceptual faculties and processes for the semantics of signs onto their forms; that is, the written forms of signs were made to map, as far as possible, whatever the meanings of signs could be perceived as having. This entailed the categorisation of 'perception', such that it might be communicable. In this way, signs in Nonarbitrer were constructed to represent three key perceptual faculties: our senses, emotions and minds. Here, the term 'mind' refers to propositional attitudes such as 'beliefs' or 'desires'. This conception of perception is loosely based upon Dennett (1978)'s *functional areas of consciousness*, although is termed in more everyday language.

As such, there was one sign indicating the communication of sensory information (a vertical line), emotional information (a square) and mental information (a circle) – these were designed to represent the movement or transfer of a percept, the human face and the human brain respectively. More signs were constructed than were used in the experiments. A list of all the sentences created can be found in Appendix A. For solely the signs used in the experiments, see Appendix B.

In the construction of signs for more precise or concrete concepts, prototype theory (Rosch, 1975) was adhered to: signs that might *look* like something were represented as prototypically (and as simply) as possible. Given the inherent limit of what might be communicable in a nonarbitrary language, there was a heavy focus given to constructing signs denoting specifically sensory, visual information – hence the need for an approach using prototype theory.

Furthermore, the writing system has three basic tiers – signs can either be written normally sized, taking up the top half of a line of writing, or taking up the bottom half of a line of writing (analogous to a lower-case letter of an alphabet).

3.1.2 Morphology

In general, signs are grouped into morphological units (the equivalent for an alphabet would be the *word*) by 'concept' – that is, several morphemes combine to form one concept, which might be described as one 'word' or 'term' if translated into a natural language. These two descriptions will be used interchangeably here.

As just described, signs can be placed in writing on three separate tiers. This defines their morphological categorisation: signs can either be called *morphemes*, *submorphemes* (occurring on the lower tier) or *supermorphemes* (occurring on the higher tier). Morphemes tend to come 'concept-initially', with supermorphemes attached alongside, and lastly (looking left to right) followed by submorphemes. This therefore indicates that Nonarbitrer is written from left to right.

Morphemes are always perceptual category terms (sensory, emotional or mental), supermorphemes always give more indication of the perceptual information in question (specifically, involving giving specific subcategories to sensory information) and submorphemes tend to be the visual representations of concepts, although they can also be classifiers. There is one classifier (marking specificity) that can be either a submorpheme or a supermorpheme.

There are five supermorphemes in Nonarbitrer, which designate whether sensory information in question pertains to visual, auditory, tactile, olfactory or gustatory information. These are designed to depict the most prototypical body parts used in their sensing: two adjacent circles (eyes), half an oval with upwards curves at either end (an ear), a lengthways rectangle with curved vertices (a finger), half a diamond (a nose) and a lengthways rectangle with curved vertices and a line from the middle tip backwards (a tongue).

Further, emotional and mental information is subcategorised in Nonarbitrer. Using Kemper (1987), four initial core human emotions have been isolated: anger, fear, happiness and sadness (the latter two called 'satisfaction' and 'depression', *ibid.*). Alongside these, ideas of 'feeling good' and 'feeling bad' (introspective or reflective self-judgements) have also been included, utilising Wierzbicka (1999), as well as the idea of 'surprise', particularly linked with the human behaviour of making comedy (called 'benign violations' with regard to 'immoral' humour in McGraw & Warren (2010), for instance).

These seven key emotions are depicted in addition to the base square emotional morpheme in attempts at representing the human face in feeling them. The additions contained within the square are: a right angle with the vertex pointing upwards (anger), a two adjacent circles (fear), half a circle with ends pointing upwards (happiness), half a circle with ends pointing downwards (sadness) and a circle (surprise). Two additions are attached to the right edge of the square: a right angle with the vertical line extending upwards ('feeling good') and a right angle with the vertical line extending downwards ('feeling bad').

In addition, five propositional attitudes have been isolated to convey mental information more specifically. These are categorised as: 'feel', 'think', 'want', 'like' and 'dislike'. The first three are depicted using the specificity classifier (see 4.1.3.) and a line indicating theoretical movement or transfer as additions to the base mental circle morpheme: 'feel' is a dot in the middle, 'think' is the same dot inside with a line extending rightwards out of the circle's circumference, and 'want' is the same construction as 'think', but instead of the dot being inside the circle it appears at the end of the line (that still goes from the circle's centre point rightwards out of its circumference).

3.1.3 Word classes

Nonarbitrer has three main word classes: Pronouns, Nouns/Objects and Classifiers. This was done primarily to cut down on the inherent arbitrariness that function words provide; all grammatical features of the language are introduced using classifiers.

There are only two pronouns: one indicating the concept of a 1st person entity, and another for a 3rd person entity. In this way, they might be translated as 'I' or 'me' and 'other' or 'it'. This was done upon the realisation that perception of people fundamentally boils down to whether they are 'me' or 'not-me' – all other features with which one might complexify a pronoun (gender, number etc.) can be done with classifiers. Nonarbitrer has no pronominal case marking (see 4.1.4. for case). Pronouns were created to have no different meaning than the concept 'human', although the term 'human' never occurs on its own in the given sentences – 'human' is designed as a circle contained within a square, or rather, a person's mental and emotional phenomena together. In this way, they are distinguished as pronouns using the specificity classifier (see below).

Nouns in Nonarbitrer were orthographically constructed to look as prototypical of their object in question as possible – in this way, the term 'objects' for 'nouns' is essentially synonymous. Object submorphemes were created for: 'building', 'place', 'tree', 'food', 'cat', 'dog', 'car', 'book', 'pen', 'chair', 'bed', 'bike', 'noise', as well as for all the concepts used to indicate colour (see below). In their overall expression, a combination of a morpheme, a supermorpheme and a classifier tend to precede – to indicate exactly how they are perceived.

Classifiers in Nonarbitrer are the most complex word class. They are used to modify meanings and serve more grammatical roles. There are fourteen in total. They will be briefly discussed:

1. Verb classifier: used to add the action to the original meaning of a noun. For example, adding a verb classifier to the concept 'car' would indicate the meaning 'drive'. Verb classifiers are not used copulatively (where the predicate plays a complimentary or adjectival role to the subject). It is designed in a way that tries to emphasise action or motion, and loosely resembles one low frequency periodic sound wave.

2. Sex classifiers: of which there are two, playing the grammatical role of 'gender' – indicating 'masculine' and 'feminine'. These are designed to resemble human sex organs.

3. Age classifiers: of which there are two, indicating the meanings of 'old' and 'young'. These are designed respectively as three and two concentric circles, attempting to resemble how the stumps of older trees have more 'age rings' once cut down in comparison to younger trees.

4. Negation classifier: it might also be considered a negative particle, but functions just as the other classifiers. It is designed to resemble a downwards-moving line, but also is identical to the negation sign used in formal logic.

5. Specificity classifier: occurring just as a singular dot, this classifier can be both a submorpheme and a supermorpheme depending on where the point of focus for an expression is desired to be. In distinguishing pronouns, the classifier occurs either centrally within the circle and square morpheme (meaning 'I' or 'me') or adjacently, to the right of the morpheme (meaning 'other' or 'it).

6. Interrogative classifier: also functioning as a particle, it occurs expression-initially and is designed as a long, straight line to indicate some sort of missing information (as is suggested in the act of asking a question).

7. Possessive classifier: this interacts quite significantly with the specificity classifier and pronouns. Designed as a line linking two 'points of focus' together, it either joins a specificity classifier

outside a pronoun to the dot within (meaning ‘mine’) or two dots together to the right of the pronoun (meaning ‘theirs’ or ‘its’).

8. Quantity classifiers: this utilises the same design as the specificity classifier; one dot alongside a sign indicates one of it specifically, two alongside indicate two of the object, and three indicate a quantity that is at least or equal to three of the object.

9. Size classifiers: similarly designed to the interrogative classifier, it occurs to the right of the concept it modifies. There are two of them, one indicating ‘bigness’ and the other ‘smallness’; the former is approximately the length of two morphemes, the latter the length of one.

10. Colour classifier: for any object term that can be deemed as sufficiently prototypical for the incidence of a certain colour, a colour classifier can be placed in a preceding position to indicate a change of meaning from the object it depicts to just its colour. For example, the submorpheme for ‘sun’ or ‘light’ means ‘white’ when the colour classifier precedes it. It is designed as a spiral with two successions; loosely representing what, upon close examination, the human eye looks like.

Following Berlin & Kay (1969)’s indication of there being 11 basic or universal colour categories, 11 colour submorphemes were created. These were (and without the colour classifier depict): white (light/sun), black (dark/moon, from *ibid.*, p. 24), red (blood, *ibid.*, p. 40), green (grass), yellow (banana), blue (water), brown (earth/soil, *ibid.*, p. 77), purple (bluebells), pink (tongue), orange (fire) and grey (ash, *ibid.*, p. 40, 86). There was a desire in their design to depict objects that might naturally exist or occur, rather than as a result of human creation, as can be seen.

11. Humanity classifiers: this might be better understood as a classifier that marks where an object falls on the animacy hierarchy (see Kiparsky and Tonhauser, 2012), but specifically marks whether an animate object is human or non-human. Where it is non-human, the negative classifier follows the submorpheme of a ‘human’ (the two combine to be a classifier); where it is human, no preceding morpheme, supermorpheme or submorpheme occurs (in other words, ‘humanity’ is zero-marked).

12. Artificiality classifiers: like the humanity classifiers, these also aim at subcategorising nouns/objects. Where an object can be said to be man-made, a line connects a ‘human’ submorpheme and the object submorpheme in question; where it can be said to be naturally occurring, a line acts to separate the two submorphemes.

13. Movement classifier: this is constructed using two specificity classifiers with a line between linking them (although where the line does not actually touch the two), normally followed by a verb classifier.

3.1.4 Syntax

Nonarbitrer has no specific basic word order; instead, the order of constituents is determined solely by the order in which the speaker perceives the sequence of events being described in an utterance to occur. In this way, transitive expressions in Nonarbitrer tend to be Object-Verb-Subject, or, using Blake (2001)’s more contemporary ‘pre-theoretical notions’ of grammatical relations, Patient-Verb-Agent. Intransitive expressions tend to have a Verb-Subject, or Verb-Patient, order.

In more detail, where more than one perceptual morpheme is used, the proscribed order within concepts is ‘sensory-emotional-mental’. Further, where a sensory morpheme is used as a verb (e.g. ‘to see’), the mental morpheme ‘feel’ can optionally precede. This is due to the ambiguity as to whether

sensory perception as a physical phenomenon in action would constitute a mental phenomenon (see Davidson (1970)'s anomalous monism for an account of why mental phenomena must be physical phenomena, for example). Finally, in multi-clause utterances, the originator of the action (the subject, or the S or A in Blake (2001)'s terms) will syntactically precede.

3.2 Experiment design

Before beginning testing, and in order to isolate the nonarbitrariness of the signs of Nonarbitrer, two further Levels of the language were created. These consisted of stylised versions of the original language, such that Level 1 (Nonarbitrer proper) was the most nonarbitrary, Level 2 was an initially stylised version of Level 1 and Level 3 was a further stylised version of Level 2. This process of stylisation involved 'artistic' processes such as the smoothening of vertices, the curvature of straight lines and, more generally, attempting to make the signs look more hastily-drawn to mimic orthographic evolution in language. Eight words (i.e. terms/concepts) of each Level of Nonarbitrer were selected, alongside a further eight from Mandarin and Basque.

Participants were asked to do two multiple-choice declarative recall tasks. First, they were given the eight lexical items of one of the three Levels of Nonarbitrer on a sheet of paper with their English translations, and were given three minutes to memorise what each item meant. Participants then did the recall task, for which there were eight questions; this entailed participants seeing one of the words/signs they had just learned, followed by four potential English answers for it (where all four options were also translations of one other word learnt previously). Following this, they repeated the same test with eight words from either Mandarin or Basque.

In this experiment, the independent variable was nonarbitrariness. This was adjusted by every third participant (of 33 overall) doing a different Level of Nonarbitrer; that is, that 11 participants did the test for Level 1, 11 did Level 2 and 11 did Level 3. Participants were not pre-selected to complete a specific level based on their personal details – an even spread of the participant pool is thus represented in each group of 11. From this, an accurate representation of the effect of nonarbitrariness on the dependent variable, functionality, can be found – thus, the calculated functionality score (see 3.2.1. and 5.2.) of each Level corresponds to the effect on participants' ability to recall it due to its arbitrariness.

3.2.1 Functionality

As mentioned above, determining the functionality of the Levels of Nonarbitrer was important to gauge how reliable the data from it would be in making claims with it about natural language. Given the failure of Wilkins (1668)'s philosophical language due to its complexity, it was felt by the researcher that some measure for comparison between Nonarbitrer and other natural languages was necessary. This was also because of anticipated objections to the validity of the use of a philosophical language in making claims about language as a whole. It was deemed that if the philosophical language could function like any other, claims from data about its use and relation to natural language would hold.

To do this, the second half of the experiment was introduced: repeating the same task for either Mandarin or Basque. These two languages were chosen for their genetic dissimilarity to English, and because one would offer an orthographical challenge to English speakers (Mandarin) where the other would not (Basque). Functionality was statistically measured as participants' time taken to answer questions in the recall task, and how accurate their responses were in guessing the correct translation for each sign, in comparison with the same data from the two natural languages. A functionality *score* was introduced to statistically compare languages, and was found by multiplying a language's mean accuracy score out of eight by its mean time taken in seconds. This is discussed further in 5.2.

3.3 Participants

33 participants took part in the test. All were recruited from the personal network of the researcher, being of all ages, genders and sexes and coming from a range of linguistic backgrounds, although 22 were monolingual English-speakers; other languages represented (as either L1 or L2) were Polish, Spanish, French, German, Mandarin, Cantonese, Basque, Italian and Urdu. 9 participants identified as female, 24 as male. The mean age of participants was 21.64 years; the mode was 20 years. Where necessary, speakers of Basque or Mandarin were given the alternate second test.

3.4 Materials

Before beginning, all participants read an information sheet and signed an approved consent form. At the start of each test, participants were given a sheet of paper with brief instructions on the ensuing task (which they had already been given verbally), the time limit and the eight words with their equivalent English translations alongside. These can be found in Appendix B. Once the allotted time for memorisation was finished, they were presented with a laptop displaying the test, coded using PsychoPy. Instructions were given both verbally by the researcher and onscreen, prior to starting. Lexical items and their respective multiple-choice options appeared in a randomised order. Participants were asked to press the number keys '1' to '4' for the corresponding correct answer for each of the eight multiple choice questions (there were four choices).

The eight Nonarbitrer words for each Level were (as English translations): 'she', 'bicycle', 'blue', 'their', 'writes', 'dislikes', 'dog' and 'treehouse'. The eight Mandarin words were (as English translations): 'he', 'I see', 'feel happy', 'old', 'sleeps', 'my', 'table' and 'house'. The eight Basque words were (as English translations): 'blue', 'bad', 'mouse', 'to be in', 'grass', 'tree', 'want' and 'children'. The Nonarbitrer, Mandarin and Basque can all be found in Appendix B.

4 Results

All data (time taken and accuracy) was automatically recorded by PsychoPy and converted into Microsoft Excel format. Graphs were also formed using Excel. Time taken is measured in seconds (s), and accuracy for each task is measured out of a score of 8 (as there were 8 multiple-choice questions). Where analyses of accuracy for individual words occur, the score is measured out of 1.

4.1 Cross-task results

4.1.1 Accuracy

Across both tasks, spanning all 5 language varieties, accuracy matched up with the hypotheses given in 2.4. above. Figure 1 shows that the more arbitrary Nonarbitrer got, the more inaccurate participants were. Participants' accuracy was also lower in Mandarin than in Basque, indicating that the genetic and orthographic unfamiliarity for mainly English speakers of Mandarin played an important role.

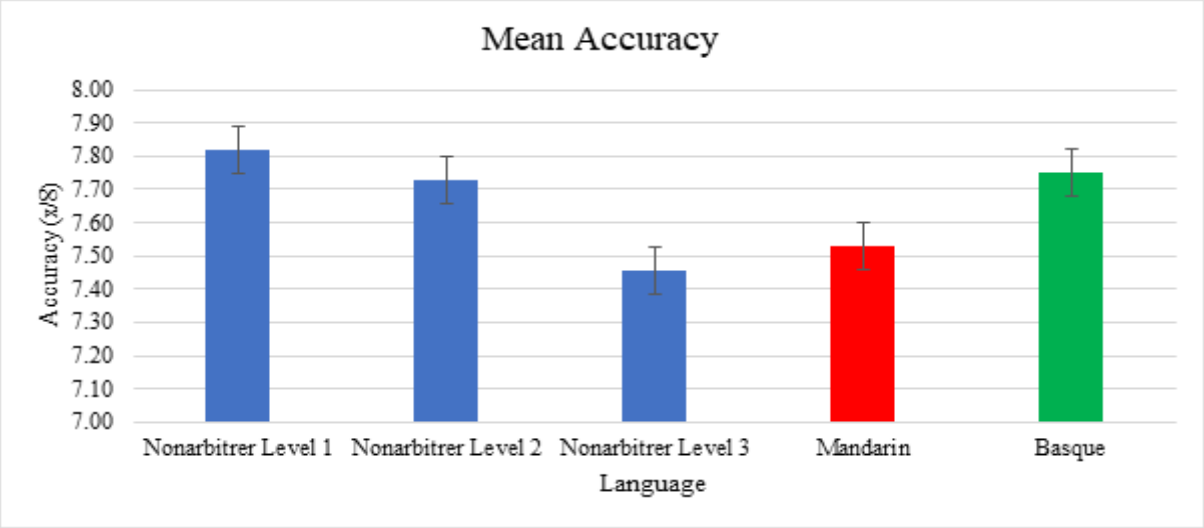


Figure 1. *Accuracy results from all tasks. Mean accuracy for Level 1 was 7.82, Level 2 was 7.73, Level 3 was 7.45, Mandarin was 7.53 and Basque was 7.75.*

4.1.2 Time taken

Data for the time taken for each task corroborates the findings from measuring accuracy above. Figure 2 shows that as Nonarbitrer increased in arbitrariness, participants took more time in responding to the multiple-choice tasks. It is interesting that Level 2 took longer on average than Level 3; this is partly due to two outliers that were not anomalous enough to be excluded, although these findings do slightly contradict the hypotheses made in 2.4 as a consequence.

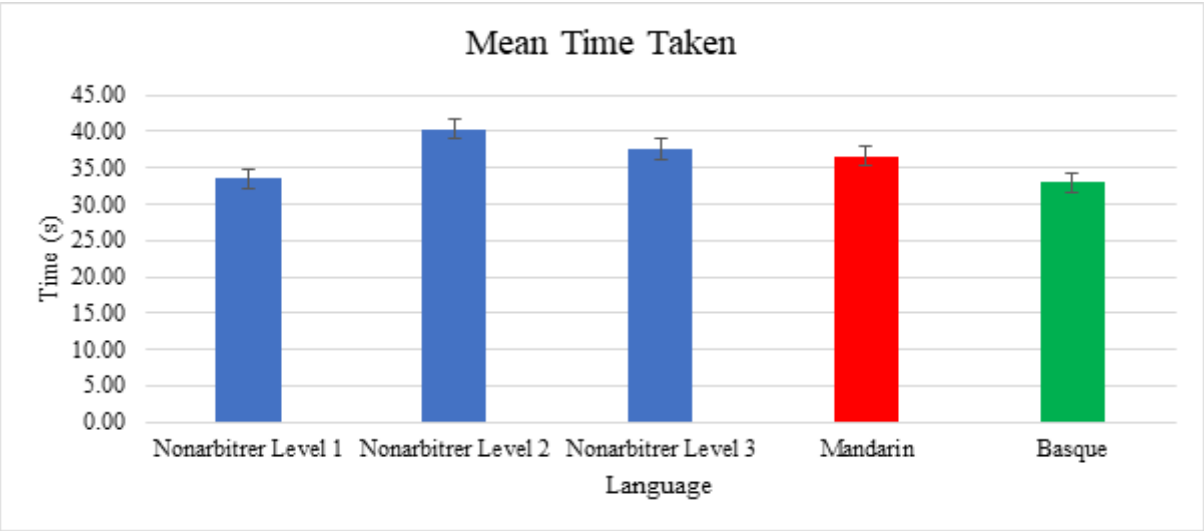


Figure 2. *Results for the time taken across all tasks. Mean time taken for Level 1 was 33.5s, Level 2 was 40.3s, Level 3 was 37.57s, Mandarin was 36.62s and Basque was 32.99s.*

4.1.3 Changes in Accuracy and Time Taken from the First to the Second Task

When comparing how individuals performed in their first to second task, and then averaging for each individual transition, performance overall tended to improve slightly. Figure 3 shows that, on average, participants' accuracy improved across tasks, so that their second task performance was 0.2 to 0.333

points better. For the transition in Figure 3 from Level 2 Nonarbitrer to Basque, there was no recorded change in accuracy. This trend in increased ability is seen also in Figure 4, where most participants saw a decrease in their time taken from the first to the second task.

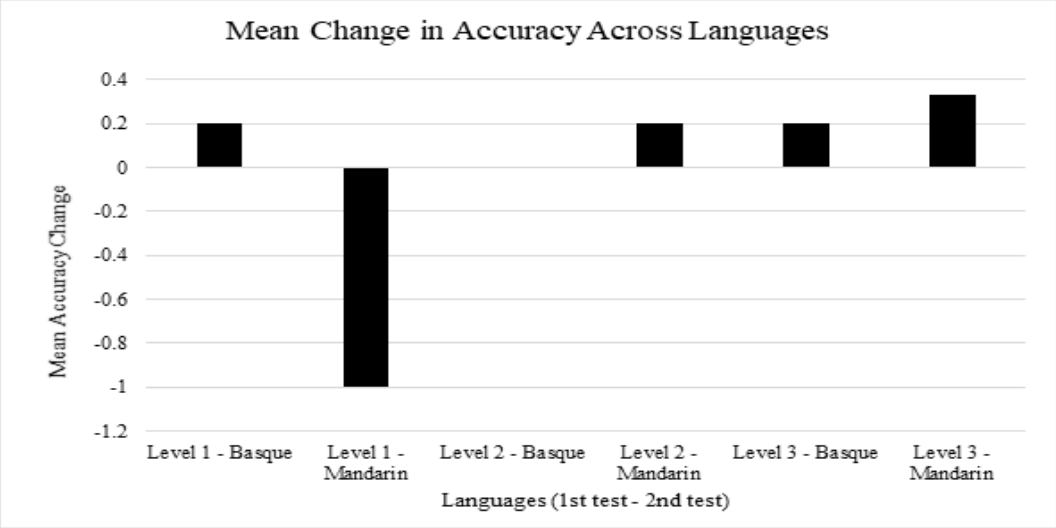


Figure 3. *Showing mean accuracy change from one language task to another. For instance, if a participant did the recall task for Nonarbitrer Level 1 first, followed by Basque, on the latter their accuracy improved by 0.2; if another started with Level 1 and then afterwards did Mandarin, their accuracy on average changed by -1. From Level 2 to Mandarin and Level 3 to Basque, accuracy increased on average by 0.2 also. For Level 3 to Mandarin, accuracy increased on average by 0.*$\dot{3}$.

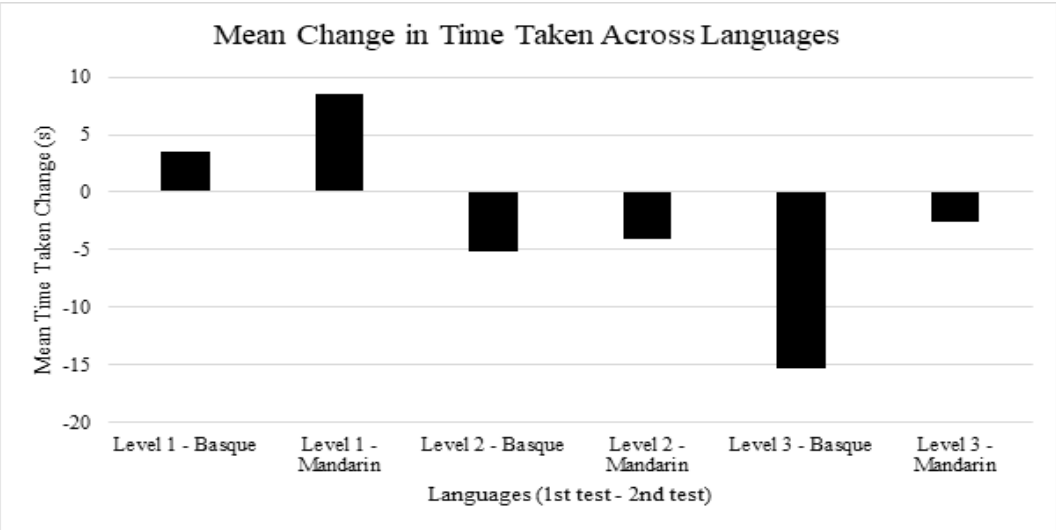


Figure 4. *Showing mean change in time taken from the first task done to the second. The same principle as in Figure 5 applies here; if a participant completed the Level 1 Nonarbitrer and then second the Basque task, on average they took 3.52s longer on the second. From Level 1 to Mandarin, the increase was 8.5s. From Level 2 to Basque, time taken changed by -5.16s, from Level 2 to Mandarin it was -4.06s, from Level 3 to Basque it was -15.3s and from Level 3 to Mandarin it was -2.6s.*

It is also interesting to see how participants' results changed when moving from any Level of Nonarbitrer to one of either Mandarin or Basque. From Figure 5, it is clear that participants found Mandarin comparatively more difficult than their previous Nonarbitrer task, and that participants found

Basque easier. These results are consistent with those found in Figure 6, where it can be seen that participants took slightly longer when doing Mandarin after their Nonarbitrer Level but were 5.62s quicker when doing Basque.

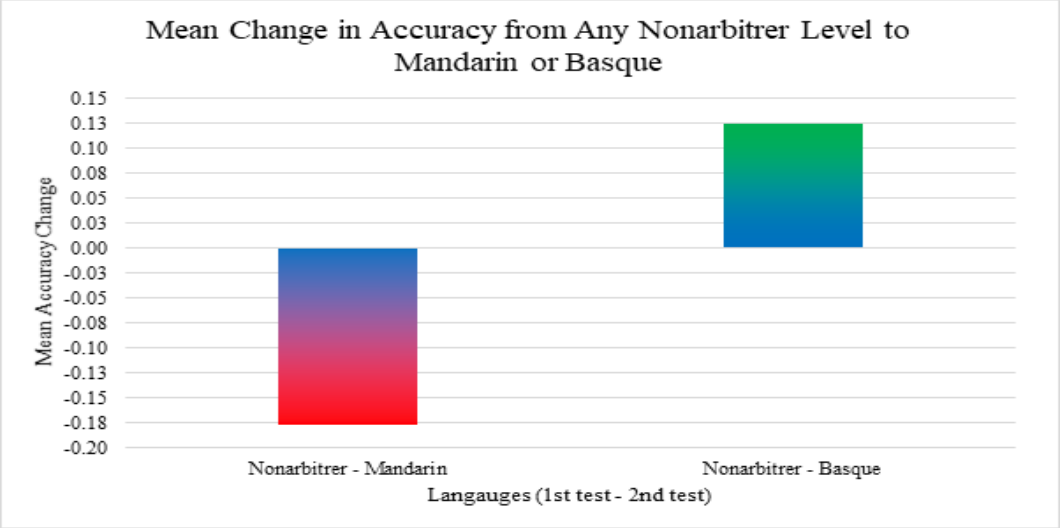


Figure 5. *Showing mean change in accuracy from any Level of Nonarbitrer to either Mandarin or Basque. Participants' accuracy changed by -0.18 points when doing Mandarin, whereas it increased by 0.13 when doing Basque.*

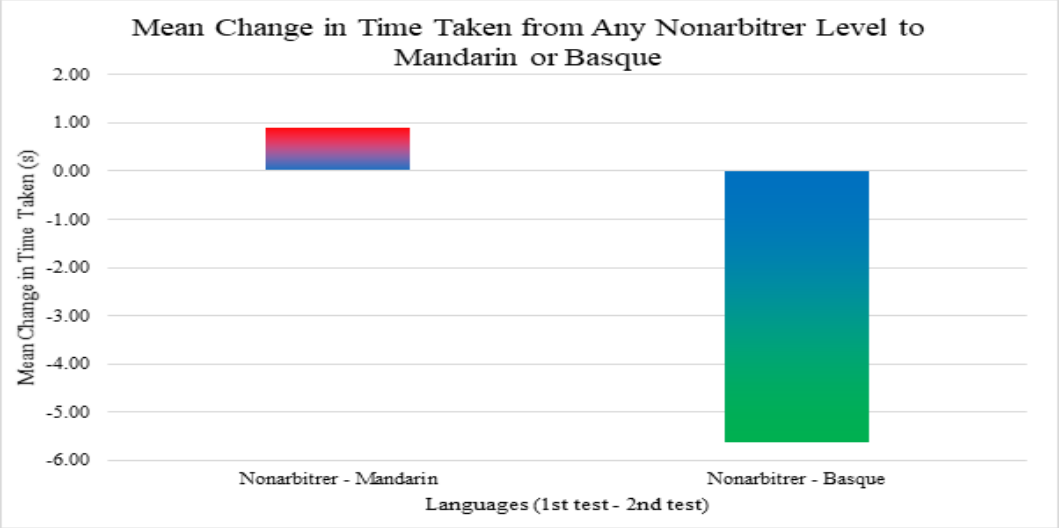


Figure 6. Showing mean change in time taken from any Level of Nonarbitrer to either Mandarin or Basque. Participants' time taken changed by 0.89s when doing Mandarin second, whereas it changed by -5.62s when doing Basque second.

4.2 Nonarbitrer results

4.2.1 Distinctions between words

Along with comparisons looking at means for each Level as above, means for each word of Nonarbitrer across all 3 Levels were recorded. Notably, participants struggled with the Nonarbitrer signs for 'dislikes' more than with any other; accuracy is considerably lower whilst taking much longer to

answer. Further, while in Figure 8 there is relative consistency across all words (apart from ‘dislikes’), in Figure 7 there is much less consistency, especially with three words, ‘blue’, ‘writes’ and ‘treehouse’, all being answered correctly in every task.

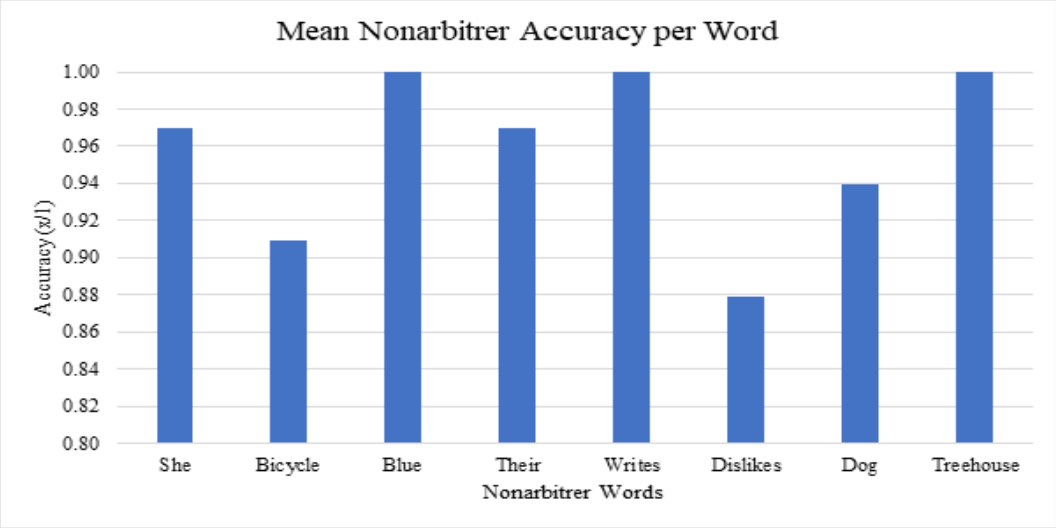


Figure 7. Results showing mean accuracy for each individual word in Nonarbitrer, across all 3 Levels and 33 experiments. The mean for ‘she’ was 0.97, for ‘bicycle’ it was 0.91, for ‘blue’ it was 1, for ‘their’ it was 0.97, for ‘writes’ it was 1, for ‘dislikes’ it was 0.88, for ‘dog’ it was 0.94 and for ‘treehouse’ it was 1.

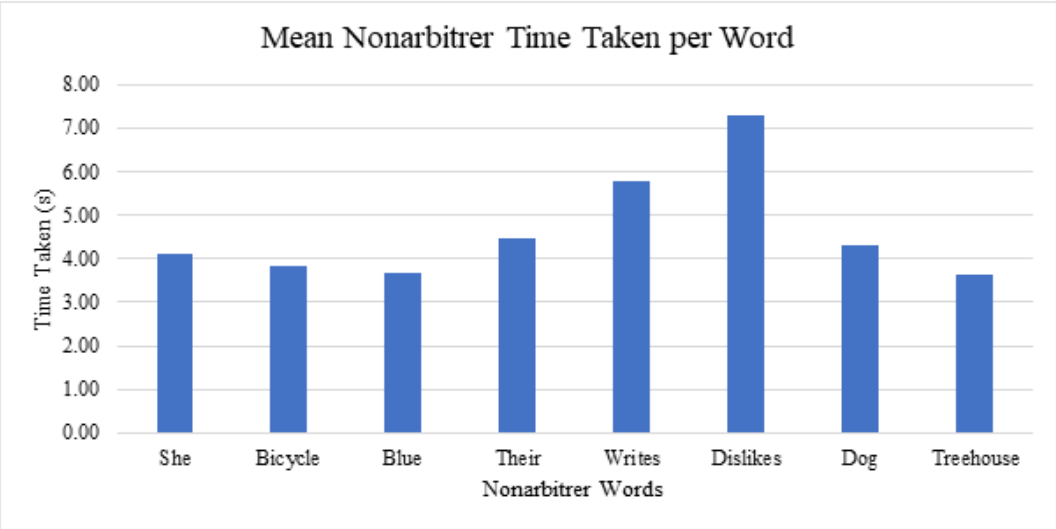


Figure 8. Results showing the mean time taken for each individual word in Nonarbitrer, across all 3 Levels and 33 experiments. The mean for ‘she’ was 4.13s, for ‘bicycle’ it was 3.83s, for ‘blue’ it was 3.66s, for ‘their’ it was 4.48s, for ‘writes’ it was 5.78s, for ‘dislikes’ it was 7.28s, for ‘dog’ it was 4.32s and for ‘treehouse’ it was 3.65s.

4.2.2 The Influence of Word Class

The inconsistency explored above in Figure 7 is more noteworthy considering there is little parallel between accuracy and word class. This is detailed further in Figure 9 and Figure 10. As can be seen, participants struggled most with verbs, tending to be less accurate and take longer with them. The distinctions found in Figure 9 are not as significant as those in Figure 10 due to the high accuracy across

all tests. In Figure 10, participants' difficulties with verbs is made clearer: they took at least 2s longer on those than on any other word class. Given that there was only one adjective, using results from it might not be reliable, although it does seem as if participants found it easiest: across all 33 tasks, it was most quickly recalled and done so most accurately.

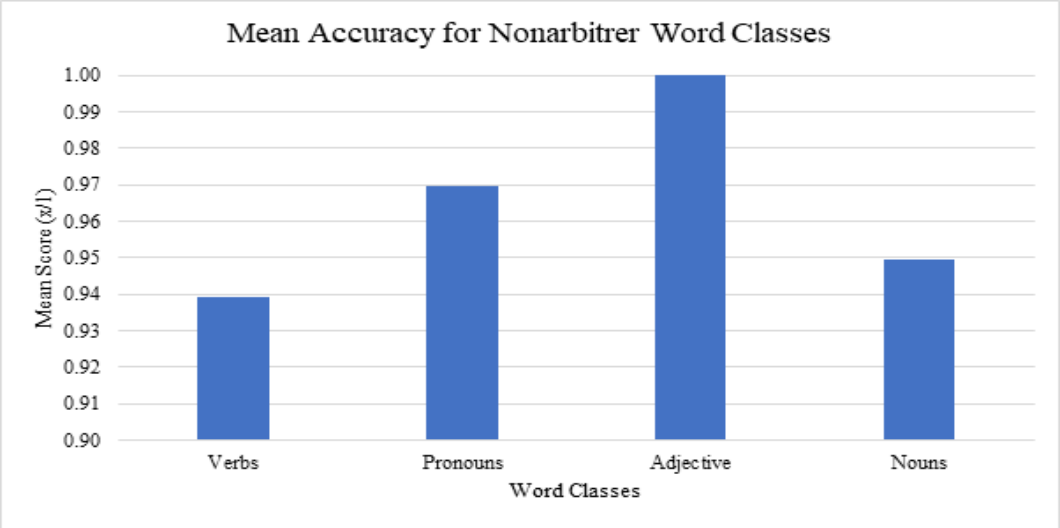


Figure 9. Results showing mean accuracy in each word class for Nonarbitrer. There were 2 verbs, 2 pronouns, 1 adjective and 3 nouns. The mean score for verbs was 0.94, for pronouns it was 0.97, for the adjective it was 1, and for nouns it was 0.95.

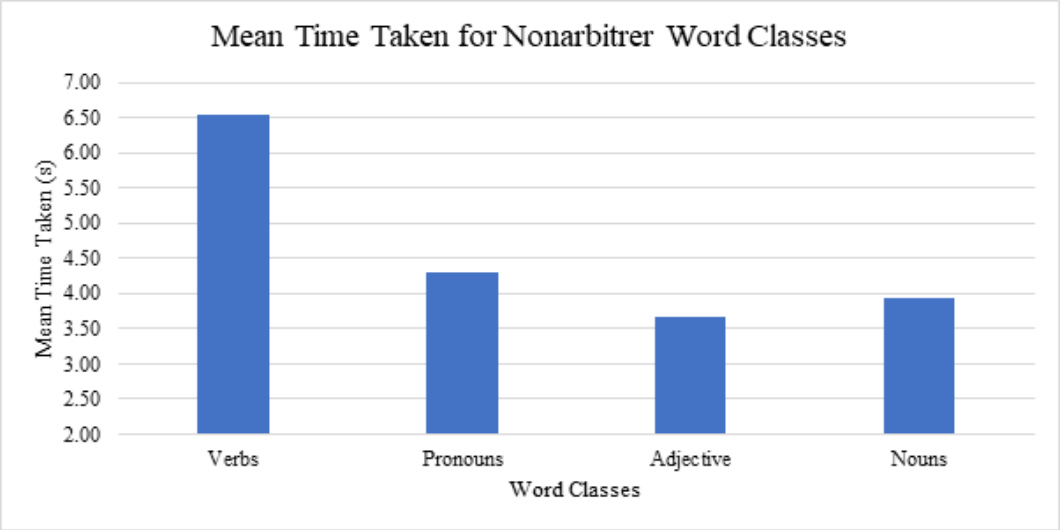


Figure 10. Results showing mean time taken in each word class for Nonarbitrer. See Figure 11 for amounts of words in each class. The mean time taken for verbs was 6.53s, for pronouns it was 4.3s, for the adjective it was 3.66s and for nouns it was 3.93s.

4.2.3 The influence of visual clarity

One final measure recorded for accuracy and time taken was the extent to which the meaning the sign denoted was clearly visibly in its form. For instance, the sign for 'bicycle' in Level 1 and Level 2 was deemed by the researcher to look sufficiently like a bicycle (in part) for it to be considered especially memorable. This was recorded in PsychoPy using the shortened 'ClearVis'. As shown in Figure 11 and

Figure 12, the ClearVis status of words had a noticeable impact on participants' performance in tasks; accuracy for ClearVis words was 0.06 points higher and time taken was just over a second quicker.

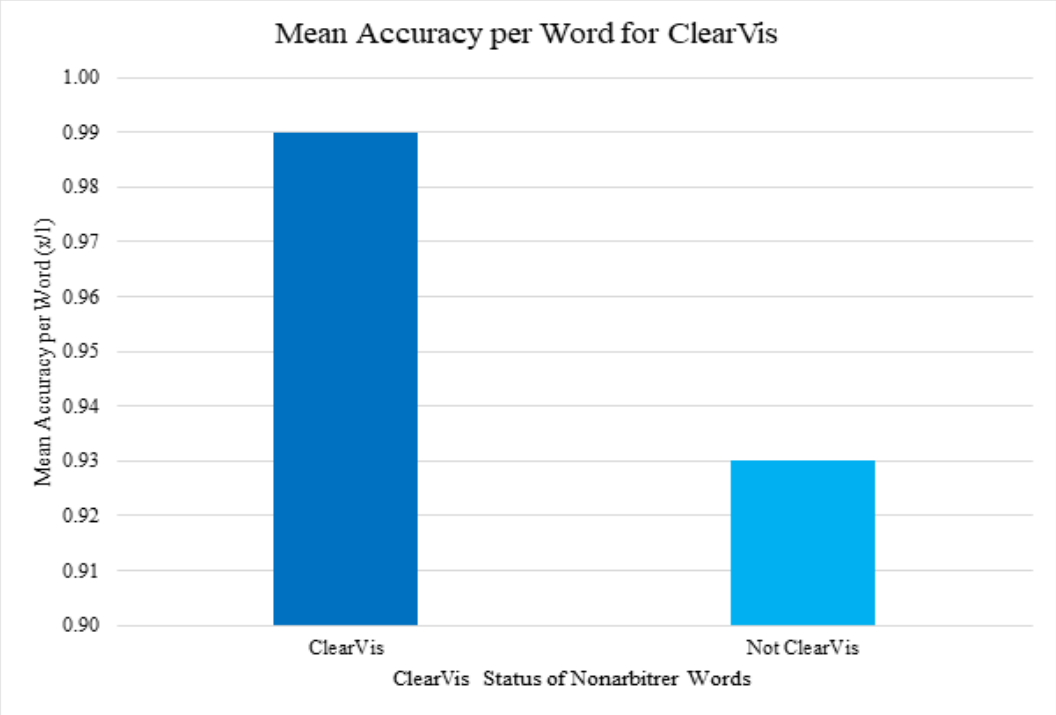


Figure 11. Results showing the effect on average accuracy per word of Nonarbitrer of whether the meaning of signs was visibly clear. Mean accuracy for ClearVis was 0.99, for Not ClearVis it was 0.93.

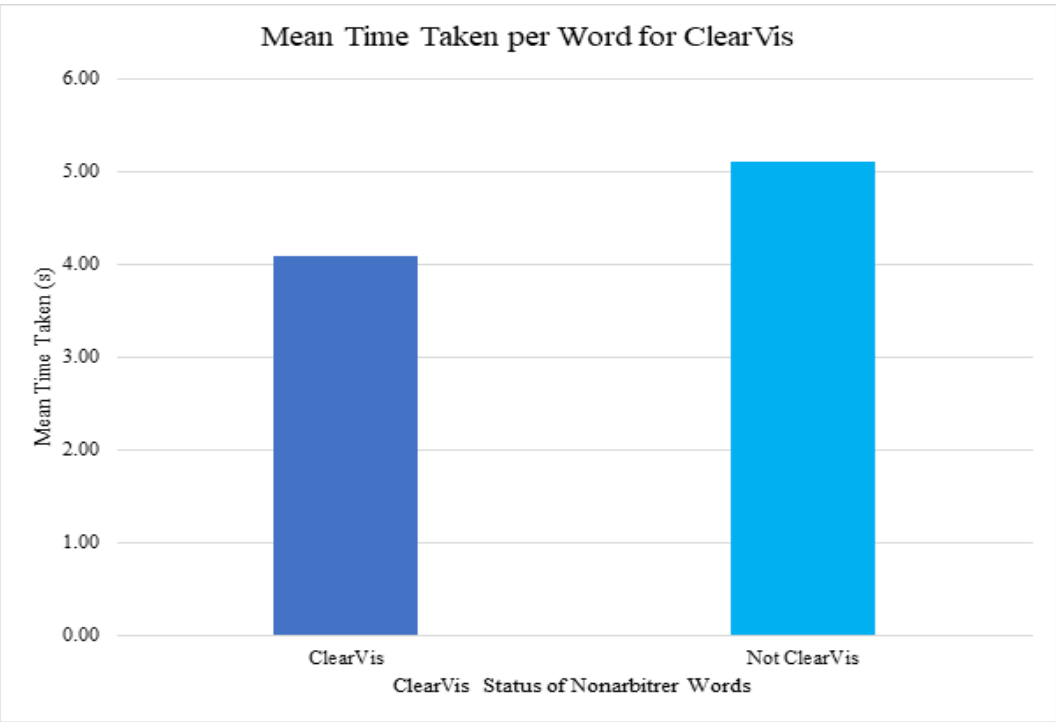


Figure 12. Results showing the effect on average time taken per word of Nonarbitrer of whether the meaning of signs was visibly clear. Mean time taken for ClearVis was 4.09s, for Not ClearVis it was 5.11s.

5 Discussion

5.1 Breakdown of general findings

Throughout the literature in iconicity, no study of this kind has been done before, so it is very difficult to compare with others. The only reference found to the concept of a nonarbitrary language was in Dingemanse et al. (2015): 'A perfectly iconic language could only serve a subset of our communicative goals, and may limit the power of language to abstract'. The results shown here seem to contradict this view: Nonarbitrer *was* just as functional as any of Mandarin or Basque, and in fact Level 1 was arguably more so (see 5.2.). Instead, results here support the claims of Givón (1985): 'All other things being equal, a coded experience is easier to store, retrieve, and communicate if the code is maximally isomorphic to the experience" – in other words, that nonarbitrariness *does* seem to give added benefits.

Furthermore, the extent of arbitrariness was found to be inversely proportional to participants' performance in tasks. Figure 1 and 2 show that for Nonarbitrer Level 1, participants were most accurate and were second quickest; conversely, they were least accurate and second slowest in Nonarbitrer Level 3. Another important effect was familiarity: as most participants were monolingual English speakers, it was found that accuracy scores were higher and time taken was lower for Basque than Mandarin: it is argued here that this is due to how participants would have been more *familiar* with the Basque alphabetic script than the Mandarin logograms, and thus were able to process and recall them easier. The impact of familiarity continued in measuring changes from the first to second tasks: Figure 3 and 4 show that, as participants became more familiar with the format of the experiment, their accuracy generally improved, and their time taken generally decreased. The combination of the previous two effects of familiarity are shown in Figure 5 and 6, where participants transitioned more comfortably in the experiment to Basque than Mandarin; on average becoming more accurate and quicker than their attempt at one of the Nonarbitrer Levels.

5.2 The functionality of nonarbitrer

One of the focuses of this paper was to show that results from a philosophical language could be deemed reliable enough to make assertions about language overall. It was claimed that if a philosophical language could be as functional as natural languages, experiments on it could be deemed reliable for such assertions. As can be seen across results comparing Nonarbitrer to Mandarin and Basque, data for accuracy and time taken are very similar. This basic comparison can be illustrated by giving a functionality score (measured as mean time taken (x/8) multiplied by mean accuracy score (s)), where the lower score means a greater functionality: Level 1 = 261.97, Level 2 = 311.53, Level 3 = 279.9, Mandarin = 272.82 and Basque = 255.67.

As can be seen, Nonarbitrer Levels give highly similar scores to the two natural languages, with Level 1 and Basque, and Level 3 and Mandarin, being especially similar. The greater functionality score Level 2 gives provides a little difficulty. Again, this was mostly due to two participants' outlying results.

5.3 The influence of word class

There were marked differences in the accuracy and time taken in Nonarbitrer depending on word class in 4.2.2. These differences were quite consistent between the two measures, as shown in Figure 9 and 10: verbs took longest and produced lowest scores, pronouns took second-longest but were second-highest scoring, nouns were second-quickest but second-lowest scoring and the adjective was quickest and had a perfect accuracy score. Although there is little research in the effect of word class on declarative memory and recall ability, these findings do partially support the findings in Martin and

Walter (1969), who suggest that it is easier to recall pronoun-initial sentences than noun-initial sentences in English, which matches up with the findings here that pronouns were recalled more accurately than nouns.

However, more broadly, these findings arguably demonstrate a certain iconicity to various word classes. Although no known work explores the relationship between form and word class in meaning, there is no reason to suggest, just like with phonaesthemes (see 2.3.2.), there could not be one. This paper offers evidence in favour of such a hypothesis.

5.4 The influence of visual clarity

As cited in 5., Dingemanse et al. (2015) claim that an iconic language might actually hinder language processing capacity. This is refuted here, most evidently in results comparing accuracy and time taken with the iconicity of the signs of Nonarbitrer. Across all 3 Levels, as shown in Figure 11 and 12, participants recalled 'ClearVis' words more accurately than 'Not ClearVis' and did so quicker. This result also supports the hypotheses made in 2.4.: that iconicity would positively impact participants' performances. It is the opinion of this paper that the reason for this pertains to the field of cognitive semantics.

Although there are no grounds to make sweeping statements about cognition from these results, it is arguable that nonarbitrariness has a positive impact on recall time and accuracy because the concepts memorised by participants in relation to the words had stronger, or more, links with the signs' forms. That is, that the increase in the extent (where 'extent' relates to the prototypicality of the design of a sign) or number of links between a sign's form and meaning in one's conceptual schema (using terminology from Fillmore (1976)) aids its recall. In this way, there were more ways participants could recall the meaning of an iconic sign than an arbitrary one – the nonarbitrariness provides an alternate method for participants to remember. This alternate method is clearly utilised, as seen in 4.2.3. When there is an arbitrary link between word form and meaning, it is proposed that there are fewer conceptual ties between the two, and therefore they take longer to recall and are done so less accurately.

5.5 Wider implications

This paper has been able to demonstrate several important facts about language, iconicity, and recall ability. Foremost, it has been shown that Cratylus could have been right – that it is at least conceivable that a language might represent something coming close to his beliefs in Plato's *Cratylus*. From this, in the creation and testing of Nonarbitrer, a number of interesting further remarks about iconicity can be made. Firstly, that iconicity appears to be beneficial in aiding recall of individual terms – this might indicate some cognitive preference for iconic signs as opposed to arbitrary ones. This finding directly contrasts both the suggestions of de Saussure (1916) (see 2.2., on how arbitrariness supposedly offers language a greater 'efficiency' for communication) and Dingemanse et al. (2015). It is noteworthy that this paper could not find any indication that iconicity aided 'the power of language to abstract', and thus at least a part of Dingemanse et al. (2015)'s claims about 'the perfectly iconic language' remain.

Finally, a rudimentary link between word class and iconicity has been found, suggesting that word class and iconicity may be linked in a way that makes certain word classes more iconic than others. Further studies with larger samples will be needed to ascertain whether these findings are reproducible.

6 Conclusion

6.1 Findings, results and strengths

The aim of this paper has been, primarily, to show that arbitrariness, from Hockett (1960)'s view of language, is not a design-feature of the linguistic sign. Although this end has been aimed at by studies in iconicity in the last few decades, the present study hopes to contribute further to the project desiring to show that the sign is not arbitrary. Following the claims made by Cratylus in Plato's *Cratylus*, a philosophical, nonarbitrary language was constructed in order to provide evidence in favour of the possibility of nonarbitrariness as a 'design-feature' of the linguistic sign.

33 people were given a declarative recall task, where they were asked to memorise 8 words from 3 Levels of the language, Nonarbitrer – where each Level in succession represented a more nonarbitrary, stylised version of the original, philosophical, nonarbitrary language: Level 1. Participants were then asked to do the same task with Mandarin and Basque to compare Nonarbitrer with natural languages. Performance was measured by time taken to answer questions and accuracy. It was shown that participants performed better in a multiple-choice task with the languages that were more *nonarbitrary* and/or with which they were most *familiar*.

It was also shown that the iconicity specifically, along with word class, had a direct impact on participants' abilities to memorise words – it was speculated that this iconic factor was due to the way in which we store meanings in our conceptual schemata.

6.2 Limitations and improvements

The most obvious limitation of this study was how limited Nonarbitrer itself is. Although its functionality has now been considered similar to natural languages, the fact that it cannot be spoken, only written, presents one easy way to criticise the findings here. This limitation exists because of time constraints; it was not possible to construct an entire language in 6 months. Further, creating a language on a vast scale would hinder an experiment's capacity to be as concise as possible; in this way, I argue, there was enough detail of Nonarbitrer for this experiment to be, at least, useful.

Another key limitation of this study was that it did not record participants' accounts of *how* exactly they attempted to memorise the lists of 8 words. Although many participants did explain to the researcher how they went about learning them (some pointed directly to the nonarbitrariness of signs as their method, others tried just to learn by rote, and a few, with Mandarin for example, attempted to construct stories around the forms of signs and link those stories to their meanings), this information was not recorded, and a repeat of this experiment including such data might reveal more about the ways in which we go about learning language.

6.3 Concluding remarks

Given the precedent in the history linguistics for believing that the sign is arbitrary (see 1.1., 2.1. and 2.2.), this paper positions itself in favour of the opposite position – that it is not necessarily. It sets out to do this from an alternate angle, hoping to combine a philosophical approach with an experimental grounding. It also comes out in support of studies in iconicity, sound symbolism and systematicity. Finally, it hopes that this unorthodox approach to the study of language provides new insight into how one might go about inquiry into the science of linguistics, as much as how to conceive of language as a whole.

References

Bacon, R. (1260 [1978]). An Unedited Part of Roger Bacon's ‘Opus maius': 'De signis'. (K. M. Fredborg, L. Nielson, & J. Pinborg, Eds.) *Traditio*, 75-136.

Bergen, B. K. (2004). The Psychological Reality of Phonaesthemes. *Language*, *80*(2), 290-311.

Berlin, B., & Kay, P. (1969). *Basic Color Terms: Their Universality and Evolution.* Los Angeles: University of California Press.

Blake, B. J. (2001). *Case* (2nd ed.). Cambridge: Cambridge University Press.

Blasi, D. E., Wichmann, S., Hammarstrom, H., Stadler, P. F., & Christiansen, M. H. (2016). Sound–meaning association biases evidenced across thousands of languages. *Proceedings in the National Academy of Sciences in the United States of America (PNAS), 113*(39), 10818-10823.

Bloomfield, L. (1933). *Language.* New York: Holt.

Burch, R. (Winter 2018 Edition). *Charles Sanders Peirce.* (E. N. Zalta, Ed.) Retrieved April 19, 2019, from The Stanford Encyclopedia of Philosophy: https://plato.stanford.edu/archives/win2018/entries/peirce/

Crisinel, A.-S., Cosser, S., King, S., Jones, R., Petrie, J., & Spence, C. (2012). A bittersweet symphony: Systematically modulating the taste of food by changing the sonic properties of the soundtrack playing in the background. *Food Quality and Preference*, *24*(1), 201-204.

Croft, W. (2003). *Typology and universals (Cambridge Textbooks in Linguistics)* (2nd ed.). Cambridge: Cambridge University Press.

Cuskley, C. (2013). Mappings between linguistic sound and motion. *Public Journal of Semiotics, 5*, 39-62.

Davidson, D. (1970). Mental Events. In D. Davidson, *Essays on Action and Events.* Oxford: Clarendon Press.

de Saussure, F. (1916). *Cours de linguistique générale [Course in General Linguistics]*. (C. Bally, & A. Sechehaye, Eds.) Paris: Payot.

Dennett, D. C. (1978). Toward a Cognitive Theory of Consciousness. *Perception and cognition issues in the foundations of psychology, 9*, 201-228.

Descartes, R. (1645 [1911]). Meditation VI: Of the Existence of Material Things, and of the real distinction between the Soul and Body of Man. In *Descartes, The Philosophical Works of Descartes* (E. S. Haldane, Trans.). Cambridge University Press.

Dingemanse, M. (2011). Ideophones and the Aesthetics of Everyday Language in a West-African Society. *The Senses and Society, 6*(1), 77-85.

Dingemanse, M. (2012). Advances in the cross-linguistic study of ideophones. *Language and Linguistics Compass, 6*, 654–672.

Dingemanse, M., Blasi, D. E., Lupyan, G., Christiansen, M. H., & Monaghan, P. (2015). Arbitrariness, Iconicity, and Systematicity in Language. *Trends in Cognitive Sciences, 19*(10), 603-615.

Dressler, W. U. (1995). Interactions between iconicity and other semiotic parameters in language. In R. Simone (Ed.), *Iconicity in language* (pp. 21-37). Amsterdam: Benjamins.

Dressler, W. U., & Karpf, A. (1994). The theoretical relevance of pre- and protomorphology in language acquisition. *Yearbook of Morphology*, 99-122.

Dressler, W. U., Mayerthaler, W., Panagl, O., & Wurzel, W. U. (1987). *Leitmotifs in Natural Morphology.* Amsterdam/Philadelphia: John Benjamins.

Engler, R. (1995). Iconicity and/or Arbitrariness. In R. Simone (Ed.), *Iconicity in Language* (pp. 39-46). Amsterdam/Philadelphia: John Benjamins Publishing Company.

Feigl, H. (1958). The 'Mental' and the 'Physical'. *Minnesota Studies in the Philosophy of Science, II*, 370-497.

Fillmore, C. J. (1976). Frame semantics and the nature of language. *Annals of the New York Academy of Sciences: Conference on the Origin and Development of Language and Speech, 280,* pp. 20-32.

Firth, J. (1930). *Speech.* London: Oxford University Press.

Formigari, L. (2008). Philosophical naturalism and linguistic epistemology. In K. Willems, & L. De Cuypere (Eds.), *Naturalness and Iconicity in Language* (pp. 25-46). Amsterdam/Philadelphia: John Benjamins Publishing Company.

Gallace, A., Boschin, E., & Spence, C. (2011). On the taste of "Bouba" and "Kiki": An exploration of word-food associations in neurologically normal participants. *Cognitive Neuroscience, 2*(1), 34-46.

Gasser, M., Sethuraman, N., & Hockema, S. (2010). Iconicity in expressives: an empirical investigation. *Experimental and Empirical Methods in the Study of Conceptual Structure, Discourse, and Language*, 163–180.

Givón, T. (1985). Iconicity, isomorphism and non-arbitrary coding in syntax. In I. i. syntax, & J. Haiman (Ed.). Amsterdam: Benjamins.

Haiman, J. (2003). Explaning infixation. In M. Polinsky, & J. Moore (Eds.), *The Nature of Explanation in Linguistic Theory* (pp. 105-120). Stanford: CSLI.

Haiman, J. (2008). In defence of iconicity. *Cognitive Linguistics, 19*(1), 35-48.

Haman, E., Łuniewska, M., Pernille, H., Simonsen, H. G., Chiat, S., Bjekić, J., . . . Håkansson, G. (2017). Noun and verb knowledge in monolingual preschool children across 17 languages: Data from Cross-linguistic Lexical Tasks (LITMUS-CLT). *Clinical Linguistics & Phonetics, 31*(11-12), 818-843.

Haspelmath, M. (2008). Frequency vs. iconicity in explaining grammatical asymmetries. *Cognitive Linguistics, 19*, 1-33.

Hockett, C. F. (1960). The Origin of Speech. *Scientific American, 203*, 88-111.

Hudson, N. (1997). Locke's Nominalism and the "linguistic turn" of the enlightenment. *The European Legacy, 2*(2), 223-228.

Kant, I. (1781). *Critique of Pure Reason* (2nd ed.). (P. Guyer, & A. W. Wood Eds., Trans.) Cambridge: Cambridge University Press (1998).

Kemper, T. D. (1987, September). How Many Emotions Are There? Wedding the Social and the Autonomic Components. *American Journal of Sociology, 93*(2), 263-289.

Kiparsky, P., & Tonhauser, J. (2012). Semantics of inflection. In C. Maienborn, K. v. Heusinger, & P. Portner (Eds.), *Semantics: Handbooks of Linguistics and Communication Science* (pp. 2070-2098). Berlin: De Gruyer Mouton.

Köhler, W. (1947). *Gestalt Psychology; an Introduction to New Concepts in Modern Psychology.* Oxford: Liveright.

Leibniz, G. (1678). *Lingua generalis.*

Lockwood, G., & Dingemanse, M. (2015). Iconicity in the lab: a review of behavioural, developmental, and neuroimaging research into sound-symbolism. *Frontiers in Psychology, 6*.

Martin, E., & Walter, D. A. (1969). Subject uncertainty and word-class effects in short-term memory for sentences. *Journal of Experimental Psychology, 80*(1), 47-51.

McGraw, A. P., & Warren, C. (2010). Benign Violations: Making Immoral Behavior Funny. *Psychological Science, 21*(8), 1141-1149.

Meier-Oeser, S. (Summer 2011). *Medieval Semiotics.* (E. N. Zalta, Ed.) Retrieved from The Stanford Encyclopedia of Philosophy: https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=semiotics-medieval

Monaghan, P., Shillcock, R. C., Christiansen, M. H., & Kirby, S. (2014). How arbitrary is language? *Philosophical Transactions in the Royal Society B: Biological Sciences, 369*.

Munteanu, E. (1996). On the object-language/metalanguage distinction in St Augustine's works. In D. Cram, A. Linn, & E. Nowal (Eds.), *History of Linguistics 1996* (pp. 65-79). Amsterdam/Philadelphia: John Benjamins Publishing Company.

Ngo, M. K., Misra, R., & Spence, C. (2011). Assessing the shapes and speech sounds that people associate with chocolate samples varying in cocoa content. *Food Quality and Preference, 22*, 567 - 572.

Perniss, P., Thompson, R. L., & Vigliocco, G. (2010). Iconicity as a General Property of Language: Evidence from Spoken and Signed Languages. *Frontiers in Psychology, 1*(27).

Place, U. T. (1956). Is Consciousness a Brain Process? *British Journal of Psychology, 47*, 44-50.

Plato. (2016). *Cratylus.* CreateSpace Independent Publishing Platform.

Putnam, H. (1975). The Meaning of 'Meaning'. *Minnesota Studies in the Philosophy of Science, 7*, 131-193.

Quijada, J. (2011). *Home*. Retrieved 11 10, 2018, from Ithkuil: A Philosophical Design for a Hypothetical Language: http://www.ithkuil.net/index.htm

Ramachandaran, V. S., & Hubbard, E. M. (2001). Synaesthesia—a window into perception, thought and language. *Journal of Conscious Studies, 8*, 3-34.

Reid, T. (1764). Section XXIV: Of the Analogy Between Perception, and the Credit We Give to Human Testimony. In *An Inquiry into the Human Mind: on the Principles of Common Sense* (Vol. 1, pp. 227-244). Charleston: Etheridge.

Rhodes, R. (1994). Aural Images. In J. Ohala, L. Hinton, & J. Nichols (Eds.), *Sound Symbolism.* Cambridge: Cambridge University Press.

Richards, I. A. (1936). *The Philosophy of Rhetoric.* Oxford: Oxford University Press.

Rosch, E. (1975). Cognitive Representation of Semantic Categories. *Journal of Experimental Psychology, 104*(3), 192-233.

Ryle, G. (1949). *The Concept of Mind.* London: Hutchinson.

Simner, J., Cuskley, C., & Kirby, S. (2010). What sound does that taste? Cross-modal mappings across gustation and audition. *Perception, 39*, 553-569.

Smart, J. C. (1959, Apr.). Sensations and Brain Processes. *The Philosophical Review, 62*(2), 141-156.

Sohn, H.-m. (1994). *Korean.* New York: Routledge.

Sorace, A. (2011). Cognitive advantages in bilingualism: Is there a "bilingual paradox?". In P. Valore (Ed.), *Multilingualism, Language, Power and Knowledge* (pp. 335-358). Pisa: Edistudio.

Sorace, A., & Filiaci, F. (2006). Anaphora resolution in near-native speakers of Italian. *Second Language Research, 22*(3), 339-368.

Subbiondo, J. L. (Ed.). (1992). *John Wilkins and 17th-Century British Linguistics.* Amsterdam/Philadelphia: John Benjamins Publishing Company.

Thomas, M. (2011). *Fifty Key Thinkers on Language and Linguistics.* Oxford: Routledge.

Vigliocco, G., & Perniss, P. V. (2014). Language as a multimodal phenomenon: Implications for language learning, processing and evolution. *Philosophical Transactions of The Royal Society B: Biological Sciences, 369*.

Von Humbolt, W. (1836 [1999]). *On Language: On the Diversity of Human Language Construction and its Influence on the Mental Development of the Human Species.* (M. Losonsky, Ed., & P. Heath, Trans.) Cambridge: Cambridge University Press.

Wallis, J. (1699). *Grammar of the English language* (5th ed.). Oxford: L. Lichfield.

Whitaker, C. W. (1996). *Aristotle's 'De Interpretatione': Contradiction and Dialectic.* Oxford: Clarendon Press.

Wierzbicka, A. (1999). *Emotions across Languages and Cultures.* Cambridge: Cambridge University Press.

Wilkins, J. (1668). *An Essay towards a Real Character, and a Philosophical Language.* London.

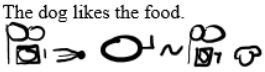
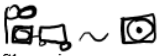
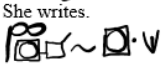
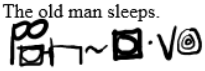
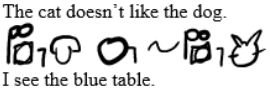
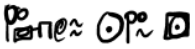
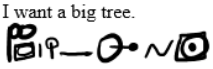
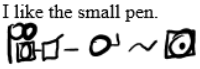
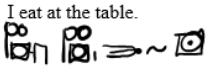
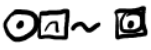
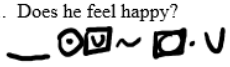
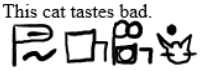
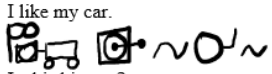
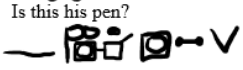
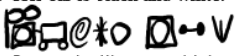
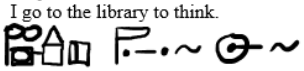
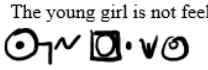
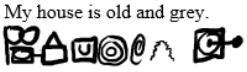
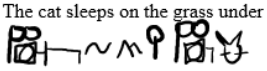
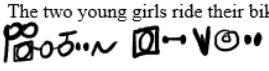
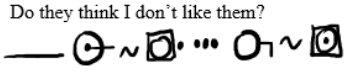
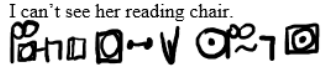
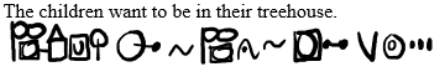
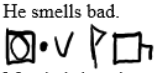
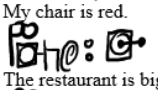
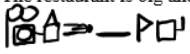
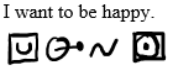
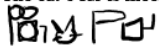
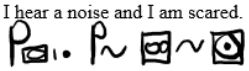
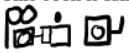
Willems, K., & De Cuypere, L. (Eds.). (2008). *Naturalness and Iconicity in Language.* Amsterdam/Philadelphia: John Benjamins Publishing Company.

Winter, B., Perlmann, M., Perry, L. K., & Lupyan, G. (2017). Which words are most iconic? *Interaction Studies, 18*(3), 443-464.

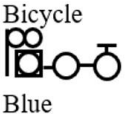
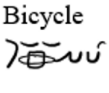
Wittgenstein, L. (1953). *Philosophical Investigations.* Macmillan Publishing Company.

Appendices

Appendix A – All Sentences Created for Nonarbitrer

1. The dog likes the food.

2. I drive the car.

3. She writes.

4. The old man sleeps.

5. The cat doesn't like the dog.

6. I see the blue table.

7. I want a big tree.

8. I like the small pen.

9. I eat at the table.

10. I feel sad.

11. Does he feel happy?

12. This cat tastes bad.

13. I like my car.

14. Is this his pen?

15. Her car is black and white.

16. I go to the library to think.

17. The young girl is not feeling good.

18. My house is old and grey.

19. The cat sleeps on the grass under the tree.

20. The two young girls ride their bikes.

21. Do they think I don't like them?

22. I can't see her reading chair.

23. The children want to be in their treehouse.

24. He smells bad.

25. My chair is red.

26. The restaurant is big and smells good.

27. I want to be happy.

28. The cat's fur is nice.

29. I hear a noise and I am scared.

30. This book is funny.


Appendix B – Lists of Words Used in Experiments

Level 1	Level 2	Level 3	Mandarin	Basque
1. She 	1. She 	1. She 	1. He 他	1. Blue *Urdinak*
2. Bicycle 	2. Bicycle 	2. Bicycle 	2. I see 我看見	2. Bad *Txarra*
3. Blue 	3. Blue 	3. Blue 	3. Feel happy 感到開心	3. Mouse *Saguaren*
4. Their	4. Their	4. Their	4. Old	4. To be in

Instructions Given:
"On this sheet there are eight words of an unknown language whose features are very unlike English. Your task is to memorise the words and their corresponding English meanings. Once 3 minutes have passed, you will be asked to recall what each word in the language means in English from a number of options."

Appendix C – Participant Consent Form

CONSENT FORM

Lancaster University

Project Title: Is Arbitrariness a Design Feature of the Sign?
Name of Researcher(s): Tom Williamson
Name of supervisor/module convenor: Professor Panos Athanasopoulos
Email: t.williamson2@lancaster.ac.uk

Please tick each box

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time during my participation in this study and within 2 weeks after I took part in the study, without giving any reason. If I withdraw within 2 weeks of taking part in the study my data will be removed. ☐
3. I understand that any information given by me may be used in a dissertation and it may also be used in publications or presentations by the Researcher, but my personal information will not be included, and I will not be identifiable. ☐
4. I understand that my name will not appear in any reports, articles or presentation without my consent. ☐
5. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study. ☐
6. I consent to having my personal information recorded for the purposes of this study. ☐
7. I agree to take part in the Researcher's study. ☐

_____	_____ DD/MM/YY	_____
Name of Participant	Date	Signature

I confirm that the Participant was given an opportunity to ask questions about the study, and all the questions asked by the Participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher _____ **Date** _____ DD/MM/YY

Appendix D – Participant Information Sheets

Student name: Tom Williamson
Supervisor name: Professor Panos Athanasopoulos
Project title: Is Arbitrariness a Design Feature of the Sign?

Participant information sheet

I am an undergraduate student at Lancaster University and I would like to invite you to take part in a research study about the way words are formed and whether their formation has any link to their meanings.

Please take time to read the following information carefully before you decide whether or not you wish to take part.

What is the study about?
This study aims to find out about the relationship between the way words are formed and what they mean, whether any such relationship is more 'necessary', and whether there is any particular preference in form for learning the meanings of words in a new language.

Why have I been invited?
I have approached you to take part because you are an English-speaker. I would be very grateful if you would agree to take part in this study.

What will I be asked to do if I take part?
If you decided to take part, this would involve taking a short test examining how easily different linguistic writing systems can be memorised.

What are the possible benefits from taking part?
In taking part, you will help settle a commonly-held view in the field of linguistics that the arbitrariness of the sign is an essential feature of language, backing up the researchers' hypotheses and other more contemporary supporting evidence.

Do I have to take part?
No. It's completely up to you to decide whether or not you take part. Your participation is voluntary. If you decide not to take part in this study, this will not affect your studies and the way you are assessed on your course.

What if I change my mind?
If you change your mind, you are free to withdraw at any time during your participation in this study. If you want to withdraw, please let me know, and I will extract any data you contributed to the study and destroy it. Data means the information, views, ideas, etc. that you and other participants will have shared with me. However, it is difficult and often impossible to take out data from one specific participant when this has already been anonymised or pooled together with other

people's data. Therefore, you can only withdraw up to 2 weeks after taking part in the study

What are the possible disadvantages and risks of taking part?
There are no major disadvantages to taking part – the test will take a maximum of approximately 30 minutes.

What type of personal data will be recorded?
Your name, age, sex, occupation, academic qualification and language background will be recorded.

Will my data be identifiable?
After the test, only I, the researcher conducting this study, will have access to the data you share with me. I will keep all personal information about you confidential, that is, I will not share it with others.

How will my data be stored?
Your data will be stored in encrypted files (that is no-one other than me, the researcher will be able to access them) and on password-protected computers.

After using the data for my project, your completed consent form will be kept separately and securely (e.g. in locked cabinets, if a paper copy exists). That is, data that can identify you will be stored separately from non-personal information (e.g. your views on a specific topic).

In accordance with University guidelines, all data will be held within the University data storage systems in line with the university policy for data security. All portable devices will be encrypted.

I will keep the data securely for a minimum of ten years.

How will we use the information you have shared with us and what will happen to the results of the research study?
I will use the data you have shared with only in the following ways:
I will use it for academic purposes only. This will include my BA thesis and other publications, for example journal articles. I will also present the results of my study at an academic conference.

If anything you tell me in the test suggests that you or somebody else might be at risk of harm, I will be obliged to share this information with my supervisor. If possible I will inform you of this breach of confidentiality.

Who has reviewed the project?
This study has been reviewed and approved by the Department of Linguistics and English Language at Lancaster University.

What if I have a question or concern?
If you have any queries or if you are unhappy with anything that happens concerning your participation in the study, please contact me via my email, t.williamson2@lancaster.ac.uk, or, should you prefer, my supervisor Professor

Panos Athanasopoulos via his email, p.athanasopoulos@lancaster.ac.uk, or phone, +44 (0)1524 593037.

If you have any concerns or complaints that you wish to discuss with a person who is not directly involved in the research, you can also contact:

Professor Uta Papen
Head of Department, Linguistics and English Language
County South Building
Lancaster University
LANCASTER LA1 4YL
Telephone 01524 592345
Email u.papen@lancaster.ac.uk

A copy of this form has been retained by the Department of Linguistics and English Language

Thank you for considering your participation in this project.