An Investigation into the Efficacy of Semantic, Phonemic, and Perceptual Prompts to Circumvent Anomia, and the Paraphasic Speech of Intracerebral Haemorrhage Victims

BA (Hons) English Language and Linguistics Dissertation

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Abstract

This dissertation substantiates research regarding the efficacy of semantic, phonemic and perceptual prompts to treat word-retrieval deficits within clinical instances of aphasia. This task was approached by digitally organising sets of interrelated images, each belonging to one of the aforementioned categories, and inserting violations to an equal number of semantic, phonemic and perceptual sequences. I hypothesized that the greater length of time a participant required to name a distractor, the more receptive they became to the preceding pattern. In addition, I opted to limit my verbal assistance to cues of a semantic or phonemic nature, and used the participants' responsiveness to these independent triggering strategies to gauge the effect of my contributions. Furthermore, this dissertation addresses salient paraphasias found within the data which support or challenge the expectations of the field. My findings, complete with cases of neologisms,

perseveration and internal sound substitution, demonstrate support for the initiation of semantic prompting techniques to assist speech therapists in circumventing anomic occurrences in aphasia.

Contents

Index of Figures and Tables

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1.0 Introduction

In this research project, I intend to expatiate upon existing research regarding lexical access difficulties experienced by victims of aphasia, investigate the efficaciousness of three independent prompting strategies, and subsequently promote a treatment approach which circumvents anomia. Recent NHS figures suggest approximately 376,000 UK stroke victims suffer from aphasia (Woods: 2016), which is characterised by “deficiencies in language comprehension and production” (Ibanescu & Pescariu 2010:vii). This figure carries weight when we consider that, despite the broadening provisions serving to provide assistance for those afflicted by the pathology, research into neurolinguistic impairment and subsequent rehabilitation techniques is an open-ended and ever-developing field.

It is understood that people with language disfluencies, particularly aphasiacs, are more likely than the linguistically unimpaired to refrain from social situations on account of their condition (Cruice et al. 2006). In an increasingly interconnected world, the necessity for intelligible communication has never carried greater significance for the development and maintenance of mental health. With a view to understanding the disorder better, I volunteered at two independent Stroke Association communication support groups over the course of two years. The group meetings aimed to incrementally improve language fluency through interaction with approved speech therapy techniques and shared understanding with fellow aphasiacs. Due to the individualistic nature of cognition, it is logical to assume there exists no one all-encompassing method of repairing oral capabilities. Consequently, no commonly accepted method for word-retrieval has yet been established in the field, with semantic feature analysis (Boyle & Coelho 1995), progressive elicitation of phonemes (Love & Webb 1977) and quality of image (Benton et al. 1972) taking precedence for different researchers with different perceptions of the issue at hand. However, I wished to investigate these three techniques, classified for this dissertation under the heading ‘semantic’, ‘phonemic’ and ‘perceptual’ prompts, to discover which assisted the process most favourably, and to promote that method to other practitioners working closely with aphasiacs.

I assembled groups of semantically, phonemically and perceptually interrelated images, appearing individually and in sequence, and recorded the speed with which each target was named correctly or confidently. In two patterns of each category, pictures were interjected which failed to follow the theme the preceding targets adhered to. I judged whether a significant difference in lexical-retrieval time was noticeable between undisturbed and disruptive patterns. This experiment was voluntarily participated in by five aphasiacs and a further three non-aphasiacs, who were included to gauge the severity of reaction times against a reference point of supposed linguistic normality.

I hypothesise that a longer dwell time on unprimed images suggests the participant was particularly receptive to the semantic, phonemic or perceptual pattern which came before it. I will also grant merit to those sequences within which targets become increasingly quicker to name, as this would imply the association is understood and mentally prepared for. Besides this, I will use the success rate of semantically and phonemically rooted verbal cues to determine whether explicit prompting encourages a different stimulus to the more implicitly structured main exercise. Furthermore, I expect a number of linguistically interesting paraphasias and related misarticulations to be present in my datasets. Therefore, I will document them fully in a qualitative analysis chapter with reference to existing research.

A more comprehensive overview of the history of aphasia, research into subcategories of the pathology, and a summary of papers investigating word-retrieval deficits within neurolinguistics are included in my literature review. The following analysis section will compartmentalize quantitative, qualitative and verbal cue results, before concluding with a verdict on the successfulness of each distinct prompting technique.

2.0 Literature Review

2.1 The History of Aphasia

To begin critiquing the current literature related to word-retrieval deficits in aphasia, it is important to provide commentary on the origin of the pathology. Although the medical term ‘aphasia’ was originally coined by Trousseau in 1865, pioneering work which enlightened the field of aphasiology predated this, none more influentially than Broca’s (1861) study of damage to the brain’s inferior frontal gyrus. The patient in this case was Louis Leborgne, or “Tan”, named after the monosyllabic pseudoword which appeared to account for his entire vocabulary. Despite being registered epileptic at the time of referral, Leborgne displayed typical intellectual and physical capabilities expected for a man of his age, with only extreme language impairments distinguishing him apart from the general populace. However, over a period of ten years, the patient’s mental faculties began noticeably deteriorating, along with symptoms such as right-side body paralysis and a mitigated understanding of his surroundings. Following his death, Broca performed a neurosurgical procedure on the patient which uncovered a significant lesion in what would later be referred to as Brodmann’s Areas 44 and 45. The physician hypothesized that damage to this frontal portion of the brain is responsible for damaging the potential for articulated speech; a theory which helped shape modern cognitive linguistics.

Broca’s area (BA 44 and 45) hosts many integral linguistic structures. Damage to this language centre notably compromises the performance of speech production and repetition. Caramazza & Zurif (1976:573) identify how “patients in this category speak effortfully; show distorted articulation; and most strikingly, produce a telegrammatic output in which syntax is restricted to simple declarative forms”. These utterances are primitive in their “omission of function words… such as auxiliaries and copulas” (Kljajevic 2012:3). Right sided paralysis is a common symptom of this aphasia, as the area is found in the brain’s left hemisphere, often resulting in problems with written communication where the victim is right-hand dominant. Despite the aphasiac’s articulatory apparatus being damaged, their understanding is generally assumed as being proficient. However, Caramazza & Zurif (1976:575) dispelled these observations during their clinical inquest, which aimed to prove a distinction between a Broca’s aphasiac’s “linguistic competence from a general heuristic capacity to comprehend language purely by means of inductive systems". Their participants were tasked with structuring the components of various verb phrases in the correct order to avoid ambiguity and as not to violate plausibility. An example shown is "the dog that the boy is patting is fat" where reversing the subject and direct object would, while not considered grammatically incorrect, be logically flawed. Results found that "when semantic constraints were absent… performance for… Broca's aphasics dropped substantially" meaning they "no longer fully control algorithmic procedures likely to operate independently from semantic content" (Caramazza & Zurif 1976:575-578). This deficit indicates a Broca's patient are limited in their understanding of the world at large.

Broca's notion of language localisation came under scrutiny in the late 19th century, with many clinical linguists instead supporting the equipotential theory. A vocal advocate of this belief was Bramwell (1898. cited in Van Gijn 2007:1177) who, following post-mortem evaluation of a lesion within a stroke victim's brain, concluded that "there is only a single language centre… encompassing all intellectual aspects of language". The concept of equipotentiality acknowledges that sensory transmissions can be mapped within the brain, but, contrastingly, that linguistic deficits are exhibited due to the extent of damage towards cerebral cells rather than their location. Influential clinicians of more recent times, including Goldstein (1948) and Head (1926), offered support for the theory, but a proliferation of evidence discrediting their belief rose to the fore.

One such study was conducted by Wernicke (1874) who broadened the concept of language centres devised by Broca by identifying a sector of the upper temporal convulsion responsible for receptive speech. Aphasiacs with trauma to this section of the brain will likely retain their fluency in speech production, yet linguistic deficits will be noticeable in this regard. For example, logorrhoea is a known symptom, and with this exacerbating manner of production come numerous paraphasias, a term defined by Ash et al. (2010) as when phonemes are "subjected to processes of substitution, deletion, addition (insertion), or transposition (metathesis)". This can render creative expressions difficult to decipher the meaning of, especially in extreme cases where productions are entirely constituted of jargon speech.

Ignorance to their errors entails that the victim's understanding is also likely to be damaged. A century prior to this discovery, Gesner (1770) examined a patient displaying many of the hallmarks of a Wernicke's aphasiac, labelling the pathology 'speech amnesia'. This study is one of the earliest documented insights into the complex field of aphasiology.

2.2 Conditions for Assigning Aphasias

Since the 19th century, classification of aphasias has proven a contentious topic within clinical linguistics due to certain commonalities between syndromes. Because of this, many cognitive scientists assume this pathology exists upon a "continuum of intactness" (Moineau et al. 2005: 886) scaling from non-fluent to fluent aphasia. However, there are some important distinctions which help diagnose a patient whose symptoms do not neatly fall into a receptive or expressive strand of the language disturbance.

Pederson et al. (2005) estimate that 25% of aphasics, one year after their stroke, register as Anomic, a proportionately large figure created using the Western Aphasia Battery. Howells & Cardell (2015:745) note that whilst anomic aphasiacs are largely "fluent with regards to rate, syntactic form, and articulation" there are noticeable "hesitations at content word boundaries" on account of their considerable difficulties in word-retrieval. Therefore, on surface level, anomic aphasiacs can initially appear cohesive and intelligent in their speech. Much like Broca's, patients will likely exhibit good understanding, however, occasional weak semantic comprehension can also be expected of an anomic individual (Caplan & Waters 1999). Although research is incrementally shifting towards online methods of treatment (Shapiro et al. 1998), the pathology is still routinely approached with offline exercises such as picture naming.

Transcortical motor aphasia (TCMA) could initially be identified as a subcategorization of Broca's, such are the consistency of mutual features between the two syndromes. The major distinguishing symptom is manifested in a patient's "intact repetition" (Freedman et al. 1984:409); a term widely favoured by clinical linguists to illuminate the fine-grained difference which separates transcortical conditions. Gold et al. (1997:375) posited that TCMA manifests itself in "poor list generation, impoverished story completion, and simplified grammar". Rubens

(1982) instead conducted research on the disparity in performance of TCMA patients in naming single lexical items, rather than their production of fully highly contextualised utterances.

Similar to the aforementioned condition, transcortical sensory aphasiacs (TSA) mirror the symptoms exhibited by those diagnosed with a more archetypal paradigm, in this case Wernicke's, in all manners except the patient's capacity for repetition. However, Tippett & Hillis (2016:916) document how the "sparing of Wernicke's area is not a necessary condition" for TSA aphasia. Boatman et al. (2000:1634) describe this pathology as one which is typically "characterized by impaired auditory comprehension with intact repetition and fluent speech".

A Global aphasiac professes extraordinarily low linguistic capabilities, notably "involving receptive and expressive language impairment" (Pai et al. 2011:185). So severe is their cerebrovascular damage that the victim's mental lexicon is usually limited to a few pseudowords or stereotypies which are inaccurately compensating for those lost. These cases are considerably rare, with figures suggesting "that the incidence of severe aphasia in patients 4- to 12-weeks poststroke is 2.5% of the 400,000 new strokes in the United States each year" (Sarno & Levita 1981:1). Having consulted clinical ethics guidelines, such as the Standards of Proficiency for Speech and Language Therapists, I decided all global aphasiacs should be exempt from participating in my study. An inability to "obtain informed consent" (Health and Care Professions Council 2013:7) and my wish to abide by the value of non-maleficence are the rationale behind this call of judgement. However, research into the condition has allowed me a reference point to establish the severity of alternate aphasias.

2.3 Word Retrieval Studies

One main and unifying linguistic deficit which victims of cerebrovascular accidents are often faced with confronting is dysnomia. It is understood within the field that "there is no consensus about the purpose and effectiveness of techniques to treat" word-retrieval difficulties (Boyle & Coelho 1995:94). Despite this, empirical evidence predating the 20th century has suggested that even "patients with chronic aphasia may show substantial improvement when systematic remediation is initiated" (Howard et al. 1985:817). A wealth of literature has been published connecting aphasia to this phenomenon which illuminates potential strategies aiming to show patterns that can be utilized to circumvent linguistic errors and miscues for future sufferers.

Marshall (1975: 165) believed that “the inability of the patient to evoke the desired word is due to an underlying loss in the efficiency of the retrieval process itself”. The clinician monitored all word-finding deficits experienced by six aphasiacs over a three-month timespan, returning 350 results, and subsequently outlined a framework which categorises four core techniques aphasics are dependent upon when attempting to access an elusive word from their mental lexicon. These are ‘delay’, where additional time to process words is afforded, ‘association’, where semantic correspondence is used to access a target, ‘description’, when those afflicted attempt to state the functions of the object they desire, and ‘generalization’, which manifest themselves are empty nouns, e.g. ‘thing’.

Careful selection of pictures can dramatically affect the aphasiacs ability to elicit a correct response, as has been demonstrated in prior research. Bisiach (1966) discovered how photorealistic interpretations of objects were more easily distinguishable to an anomic, as opposed to both coloured and outlined pictures. The work of Benton et al. (1972) developed upon this grounding research, and queried whether a distinction in dimension of images assisted the aphasiac in producing a correct response. Results suggested how “three dimensional representations carry ‘redundant’ information… which facilitates the retrieval of the name of the object, possibly by arousing a larger number of associations”. Besides visual features of the image, attention must be paid towards the frequency in which the object is known within general society. Rochford & Williams (1962: 377) noticed “a close correlation was found between the difficulty presented by the object… and the number of cues required to elicit its name”, leading me to select high frequency nouns, as classified by Thorndike and Lorge’s (1944) comprehensive word-count corpora.

Rochford & Williams (1962) also stress the importance of an appropriate use of prompts when researching word-retrieval deficits. With the intention of eliciting a target word from 32 participants, four cues were offered by the clinicians. “Cue (a) consisted of a simple description of the object’s use; (b) provided a verbal context; (c) attempted to evoke the name by a rhyme” and "(d) spelt the name aloud" (1962: 377). These categories have been systematically refined and critiqued in recent years, with two independent approaches harnessing considerable praise. The first is Semantic Feature Analysis (SFA) which is "designed to improve retrieval of conceptual information" by eliciting "words semantically related to the target" (Boyle & Coelho 1995:94). Since the conception of SFA, Hillis (1989) has proposed various adaptable phrases within a "cueing hierarchy", each focusing on a different component of the semantics of an object, such as its function or place within a housed sentence, to help speech therapists practically apply the theory. SFA has been tested and supported by contemporary neurolinguists Magesh & Shanker Patil (2013) who observed positive anomic combativeness in 3 victims of Broca's aphasia participating in their study. The second prompting strategy is by way of producing the opening phoneme of the elusive word. Although the acceleration of technology has resulted in this approach being effectively initiated by micro-computers (Bruce & Howard 1987), there are multiple academic examples of phonemic assistance proving successful when offered by therapists (Love & Webb 1977, Pease and Goodglass 1978). These findings determined the inventory of prompts used to assist dysnomic instances expressed by aphasiacs in response to the sequences included in this experiment.

Herbert et al. (2012) observed how lexical therapy was saturated by experiments focusing on word-retrieval in isolation, rather than priming the patient for connected speech. Therefore, the linguists housed their target words in determiner phrases, differing in form between '*the + noun*' and *'some + noun'*. These two articles were chosen specifically with the intent of "requiring the participants to consider the combinational properties of the target words" (Herbert at al. 2012:615). In light of this research, I amended my selection of picture cards to include certain plural forms, e.g. 'some lemons' and 'some clouds', and provide the opportunity to prompt using an alternative determiner.

Current literature suggests that the neurolinguistic concept of perseveration, defined by Cohen & Dehaene (1998:1641) as "the inappropriate repetition of a preceding behaviour when a new adapted response is expected", is likely to be displayed by the participants of this study. Corbett et al. (2008:364) attest that "aphasic patients show a particularly high incidence of recurrent perseverative errors in both spontaneous and provoked speech”. This statement is supported by findings from Yamadori (1981:591), where “verbal intentional perseveration was found in 33 of 38 aphasic patients” who were tasked with repeating sentences incrementally increasing in regards to syllable length. These miscues have been further scrutinized into separate paradigms in an attempt to justify them, with theorists focusing on the repetition of whole words, known linguistically as ‘clonic perseveration’, and nonwords (Hirsh 1998), in addition to verbal errors which occur “immediately after the source, and others recurring after much longer intervals” (Eaton et al. 2010:1018). Although it is documented how “stimulus manipulations that bias competition towards new targets and away from previous responses have been shown to decrease perseverative rate” (Corbett at al. 2008:365), this paper groups images by semantic, phonemic and perceptual correspondence, so the potential for perseveration remains high. Therefore, this research allows for a further linguistic symptom of aphasia to be analysed within my own primary data.

2.4 Critique of the Literature

Through synthesizing the aforementioned literature, I possess a greater understanding of the founding studies within the field of aphasiology. To accompany this, I have increased my knowledge of the linguistic characteristics expected of an archetypal example of each subtype of the pathology. This will help contextualise the errors made by the participants of the study, to see whether their symptoms mirror those in the clinical description of their condition. Importantly, this corpus of academic literature has enriched my inventory of therapy techniques to circumvent word-retrieval difficulties, and I now wield a greater ability to identify verbal errors which corroborate or oppose pre-existing studies. Particular focus will be placed upon the three considered approaches for overcoming anomia, those being eliciting semantic associations (Magesh & Shanker Patil 2013; Boyle & Coelho 1995; Hillis 1989), phonemic associations (Love & Webb 1977; Pease and Goodglass 1978; Bruce & Howard 1987) and perceptual qualities (Bisiach 1966; Benton et al. 1972). Otherwise, I wish to expound upon research into cueing strategies (Marshall 1975; Rochford & Williams 1962), in addition to verbal perseveration (Corbett et al. 2008) and related paraphasias.

3.0 Methodology

3.1 Participants

For the past 24 months I have volunteered at two Stroke Association Communication Support Groups in Macclesfield and Hartford. During this experience I have interacted with victims of cerebrovascular accidents and worked in co-operation with speech and language therapists to re-establish a degree of their language and confidence in social situations. From the contacts I made, two Broca's aphasiacs, two Transcortical Motor aphasiacs, one Wernicke's aphasiac and two non-aphasic stroke patients agreed to participate in this linguistic experiment. I also appealed to their family members, specifically targeting senior citizens with no medical history of brain damage, to partake in the exercise. By doing so, I could calculate the difference in outcome between the two demographics and subsequently interpret the aphasic results more clearly. This search yielded one further non-aphasic participant, resulting in a total of three volunteers classed within this category. My small corpus of results does not claim to be representative of all afflicted by the pathologies mentioned, but rather presents a series of case-studies which highlights individualistic receptivity towards three distinct and implicit prompts.

3.2 Development and Execution of Exercise

I created a concise PowerPoint presentation, with each slide displaying one large, easily distinguishable image of a common noun. I sourced the pictures used in the study from online databases, such as Google and PA Images, and selected targets influenced by the findings of Bisiach (1966) and Benton et al. (1972). These visuals were ordered to form 3 groups each of 4 semantically, phonemically, and perceptually related items, with blank screens interjected between each grouping to indicate where the pattern began and ended. Knowing how the group use flashcards to assist lexical access during meetings, I also created a physical equivalent of the test if, for instance, a participant struggled seeing the screen clearly. I believed that recognising a linguistic pattern would quicken word-retrieval in instances where the following picture abided the rule, as the brain is primed for a pre-established relationship. To determine which of the three interrelated sets best helped the group recognise a word, I inserted two sequence-breaking images per category into the experiment. My hypothesis states that the longer it takes a participant to name a disruptive object at the end of a semantic, phonemic or perceptual sequence, the more receptive they became to it. It is my belief that an exaggerated hesitation suggests a pre-empted expectation to complete a pattern a participant was confident in following. Similarly, where an aphasiac recognises the three lexical items, pre-onset of a sequence breaker, at a progressively quicker rate, this would indicate successful priming.

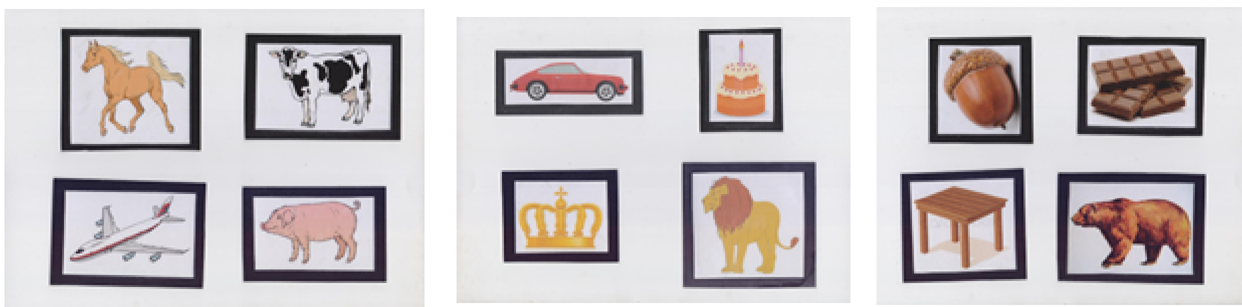

Figure 1. Example of i) a semantically disruptive sequence ii) a phonologically disruptive sequence and iii) a perceptually adhering

The exercise was audio recorded in order to analyse dwell time on each group of pictures. I utilized two pieces of technology for this task, namely a Sony ICD-PX240 Digital Voice Recorder, in addition to the PowerPoint recording. This dual application was decided upon as I became cautious not to encounter a methodological complication by virtue of overreliance on one device to accurately measure milliseconds, which can be considered a fine-grained variable. I asked the participants to name the pictures in their own time, and informed them of their right to ask for intervals if they were succumbing to mental fatigue. I only deemed it necessary to offer a prompt where the participant appeared frustrated of discomforted by their dysphasic incident, and specifically applied two assistive strategies supported by pre-existing literature. The first cue was Semantic Feature Analysis (SFA), where I described associations to, functions of, and connotations of the target, whilst the second cue involved presentation of the opening syllable of the target.

For my quantitative analysis, I chose to collate the data by participant, and measured each individual's reaction times towards all stimuli. I later interpreted their semantic, phonemic and perceptual reaction times independently, and compared the average number of seconds required to name both sequence-adhering and sequence-disruptive images within these sets, to determine which interrelated category aided word-retrieval most efficaciously for them individually. An identical methodology was performed on data collected from the non-aphasic counterparts. Once all statistics were compiled, I designed graphs and tables to visually convey patterns between the aphasias and in comparison with the non-aphasic contingent of the study.

Furthermore, I chose to give consideration to salient paraphasias present within my data which would not be highlighted in a wholly quantitative study. To accomplish this, I transcribed all conversations into Microsoft Word 2016, making efforts to include notations listed under the Jefferson Transcription System (2004), such as (.) and ↑ to give a more comprehensive account of the discourse. I later referred my observations back to neurolinguistic literature. The rationale behind adding a qualitative segment of my results was to discover whether my primary data corroborates the findings of fellow researchers, particularly in reference to specific language impairments which constitute diagnostic indicators of different subtypes of aphasia. For example, cases of perseveration, internal sound substitution, pseudo-word coinage, semantic approximation and improper use of derivational morphology were addressed.

3.3 Ethical Considerations and Data Storage

I prefaced each conversation with an information sheet handed to all candidates, which, in simple terms, outlined what I expected of them. It was important to initially deceive volunteers as to the hypothesis behind the experiment in order to counteract the possibility of Observer's Paradox. This sociolinguistic notion was theorised by Labov (1972:209) who suspected that an altered version of a speaker's natural response can be expected when they are "systematically being observed" by a researcher. However, mindful of adhering to non-maleficent practice, I informed participants of my intentions once all data had been received. Ulatowska (1979:322) voiced the opinion that researchers "should proceed with patience and humility" when interacting with aphasiacs, and I have taken that into account, as "the political and moral imperative for transparency of decision making about clinical care…has never been higher" (Anderson & Van der Gaag: 2005: 43).

Besides this, I recorded each individual's age, their aphasia subtype, and the length of time since they suffered their stroke, before asking them to carefully read and sign a consent form. This explained a number of moral imperatives I would strictly follow, such as secure data handling, anonymity of results and the absence of repercussion were the participant to abort the exercise. Participants were made aware that transcriptions of the picture naming task were stored on a password protected computer, to later be destroyed following university protocol.

4.0 Quantitative Results

This section will elucidate the most prevalent aphasiac response times towards semantic, phonemic and perceptual stimuli, which will work to determine the most effective associative prompt. Additional focus will be paid to the contrasting scores registered by non-aphasic participants, which assist to contextualise the delays by using able-minded counterparts of similar ages as reference points.

4.1 Semantic Sequences

With eight participants naming two sequence breaking images per interrelated category, this amounts to a maximum potential score of 16 correctly accessed semantically, phonologically and perceptually disruptive items each. Where the amount of seconds required to name the disrupting picture significantly exceeds the time needed to process the preceding sequence-adhering nouns, this will be classified as successfully disruptive. Evidence shows how 9 semantically interruptive images were effective in this regard, whilst only 6 and 3 of a possible 16 posed relational difficulty for the phonetically and perceptually disruptive pictures respectively.

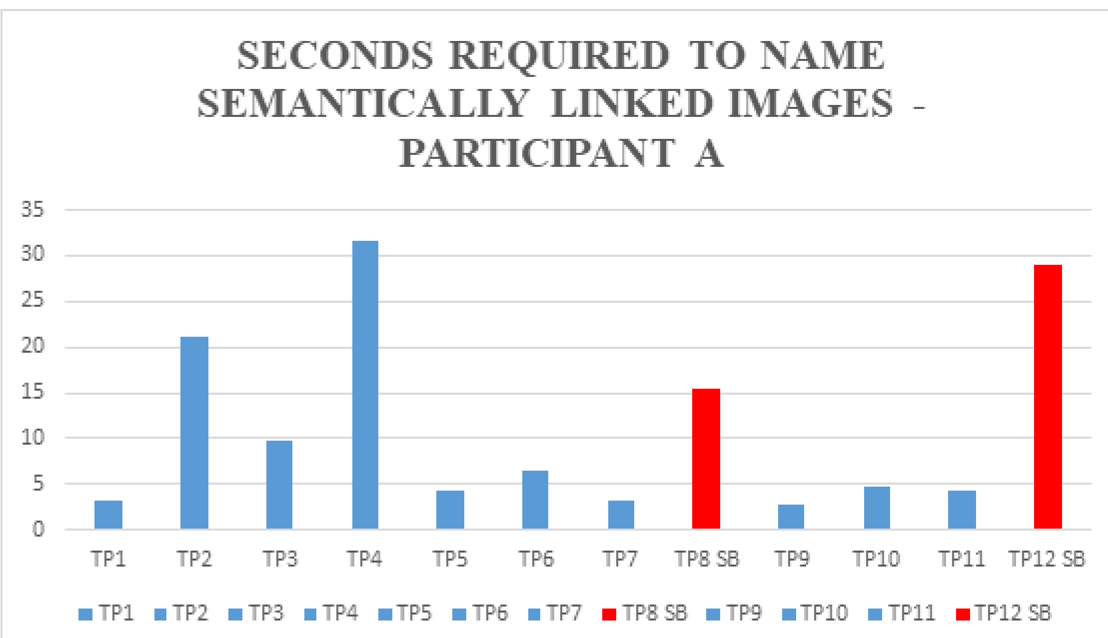

Figure 2. The total number of seconds needed for Participant A to formulate a response to semantically linked stimuli

Participant A required, on average, 13.03 seconds longer to name semantically non-conforming images as opposed to those which adhered to the pattern. This statistic represents the highest disparity in performance achieved across all scores for all participants, and could be seen to grant support to the suggestion that semantic prompts aid word-retrieval most efficaciously. However, as shown in Figure 2 above, TP2 registered a total of 21.15 seconds, whilst TP4 received a response time of 31.58 seconds, which tells how the pictures are not becoming easier to name as the sequence continues to gain momentum.

4.1.1 Semantic Immediacy

The fluctuating nature of results registered by Participant A was contrasted in Participant B's data, where the aphasiac was shown to become progressively quicker at retrieving words from their mental lexicon at the onset of semantically interrelated images. This is exemplified in the sequence beginning with TP9, where times of 3.68, 1.90 and 1.57 seconds were registered in succession. This relatively rapid autonomous naming is subsequently broken by a score of 4.26 triggered by the presentation of a sequence breaker.

The apparent efficaciousness of semantically interrelated sequences for word-retrieval purposes is evidenced by the ratio of Participant B's immediate to unsuccessful productions. Figure 3 demonstrates how the aphasiac managed to name 60% of semantic images in under 5 seconds, whilst both phonemic and perceptual stimuli achieved this relative immediacy on only 2 occasions from a possible 10. Furthermore, whilst Participant B proved either unable to produce a response, or provided an inaccurate response, on 20% of semantically conforming pictures, this figure is eclipsed by the 70% and 80% registered on phonemic and perceptual stimuli respectively. These findings support the position of Magesh & Patil (2013:119) who believe "strengthening the associations between a target word and its prototypical semantic characteristics results in a greater ease with which the words are retrieved".

	Semantic	Phonemic	Perceptual
Immediate Retrieval	6	2	2
Delayed Retrieval	2	1	0
Delayed Retrieval with Assistance	0	0	0
Unsuccessful Retrieval	2	7	8

Table 1. The immediacy, independence and accuracy of Participant B’s word-retrieval.

4.2 Phonemic Sequences

The most salient observations used to determine the successfulness of phonemic sequences are found within Participant C’s transcriptions. The aphasiac appears wholly unreceptive to implicit cues of this nature, evidenced by the misnaming, and consequent approximations, of TP19 and TP23. Having correctly named “dog” and “dress”, the Broca’s patient offers the suggestion “fish” where “dolphin” was expected, with a similar example appearing later, when “hat” was accessed rather than “crown”, despite “car” and “cake” being successfully identified before it. Such guesses bear little phonetic relation to the pre-established pattern, which supports the inference that Participant C was insufficiently supported by phonemic attempts. Although Participant E utters comparable miscues to Participant C , despite being shown to require, on average, 3.66 seconds longer to name a phonetically dissimilar target from the preceding three images, they. For example, were the sequence TP21 –TP24 to be priming successfully, an answer of ‘cat’ after ‘car’, ‘cake’ and ‘crown’ would be more likely than the actual suggestion of ‘tiger’.

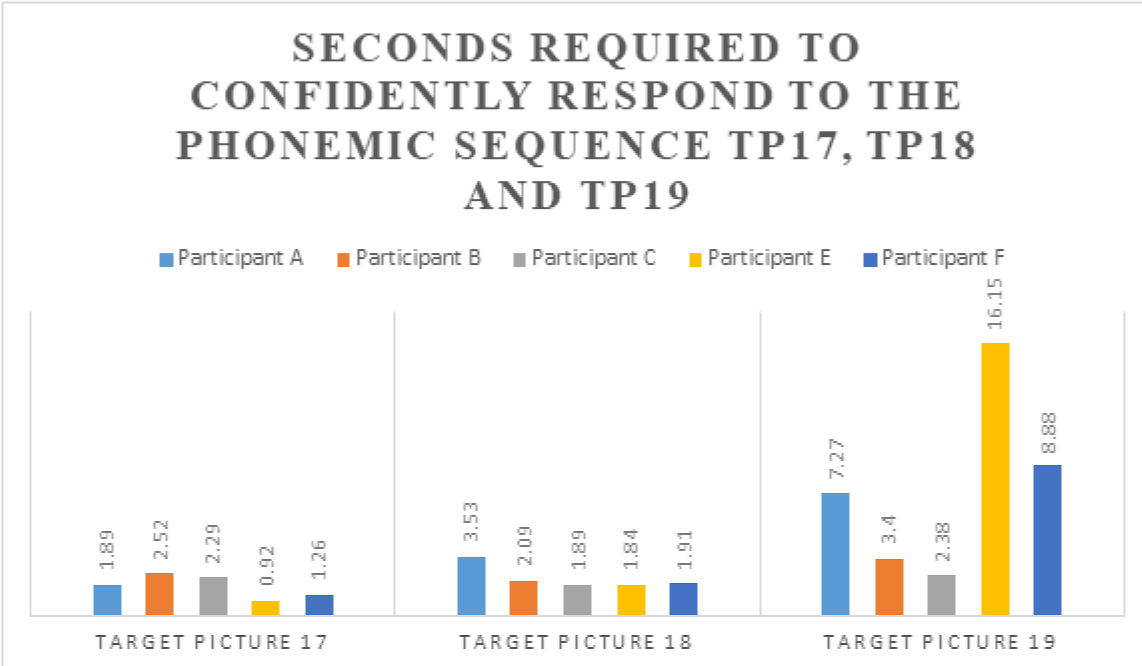

Figure 3. The total number of seconds required for aphasic participants to respond the phonemic sequence TP17, TP18 and TP19.

One notable outlier from Participant F's data is observed within a phonemic sequence, specifically in response to TP19, which registered a retrieval time of 8.88 seconds. This is clearly not representative of the aphasiacs ability to succinctly access words from their mental lexicon, as excluding this exception, Participant F achieved an average retrieval time of 1.81 seconds over 35 images. This aberration was replicated across the study, being visually depicted in Figure 3, as four fellow aphasiacs, and one non-aphasiac, either hesitated, required assistance or were unable to distinguish a whale from a dolphin. I can reasonably suggest that because answering confidently and correctly to this phonemically adhering image proved excessively demanding, this method of priming was not greatly successful.

4.3 Perceptual Sequences

There appears to be little significance to suggest perceptually related images assist in priming word-retrieval. Interestingly, only the Transcortical motor aphasiacs were shown to be more hesitant in naming the sequence-breakers as opposed to the conforming pictures. However, as

Participant F registered a mere 0.04 second increase on average when confronted with a target of conflicting colour, I cannot deem this notable enough to confidently advocate the efficaciousness of perceptual prompts.

	Participant A	Participant B	Participant C	Participant E	Participant F
Average Normal Perceptual	5.51	6.55	3.92	1.87	1.73
Average Sequence Breaking Perceptual	2.97	3.37	2.37	4.44	1.77
Time Difference	-2.54	-3.18	-1.55	2.57	0.04

. A comparison of the average number of seconds required for aphasic participants to name perceptual stimuli and related sequence breakers.

As shown in Figure 6, perceptual sequence breakers were, on average, quicker to name by Participants A, B, C and F, than images performing the equivalent function in semantic and phonemic patterns. In the most extreme comparison, Participant A is shown to access the two perceptually non-adhering targets, on average, over seven times quicker than the semantic sequence breakers. Even if we contextualise this disparity and subsequently discard the score attributed to Participant A's response to TP12, considering it an outlier, the aphasiac still required 9.5 seconds longer to name TP8 than was needed to name TP28 and TP32 combined. This implies that the distinction between a regularly performing sequential image within this the perceptual category, and one designed to disrupt the pattern, was not overtly influential on processing time.

	Average Semantic SB	Average Phonemic SB	Average Perceptual SB
Participant A	22.20	3.05	2.97
Participant B	5.25	5.15	3.37
Participant C	3.30	4.64	2.37
Participant F	2.14	1.92	1.77

Table 3. A comparison of the amount of seconds required for Participants A, B, C and F to name sequence breakers within the three independent implicit prompts.

When dismantling the perceptual sequence breaker category into two separate targets, it becomes evident that TP28 causes the aphasiac participants considerably less difficulty than any other individual interjectory image. At 1.96 seconds, this picture was named, when averaged across the corpora of five volunteers, 0.97 seconds faster than the next easily identifiable target, the phonemically disruptive TP24. In consideration of the apparent ease with which perceptually non-adhering images are processed, in spite of patterns designed to cause naming difficulty, I can reasonably dispense with the notion that perceptual images assist the word-retrieval process.

4.4 Comparison with Non-aphasic Participants

Analysis of comparably aged, non-aphasic participants allows a point of reference to gauge the severity of reaction times posted by the aphasic contingent of this study. As predicted, a clear disparity in reaction times was observed between the aphasic and non-aphasic contingents of the study. The three non-aphasic participants responded within one second on thirty-six occasions, whilst, in comparison, the five aphasic individuals achieved this rapid autonomous naming seven times. Similarly, Figure 7 illustrates how the non-aphasiacs succeeded in undercutting the aphasiac group in relation to the amount of seconds needed to confidently name each sequence-breaker. The relative consistency in processing speed shown by the non-aphasiacs is starkly apparent, culminating in a range of 1.12 seconds in contrast to a range of 5.97 seconds demonstrated by the linguistically impaired.

Despite this, I considered how the sequence's efficaciousness was relative to the participant's current word-retrieval capabilities, and with this in mind, could posit that implicit prompts assisted the aphasic group more dramatically. My barometer of success was based upon instances where participant's retrieval times declined as sequences continued their semantic, phonemic or perceptual theme, before requiring an unusually longer amount of seconds at the onset of a sequence-breaker. The aphasiacs were shown to follow this pattern on four occasions. Comparatively, the non-aphasiacs were shown becoming quicker in their response before the interjection of a sequence-breaker just one time.

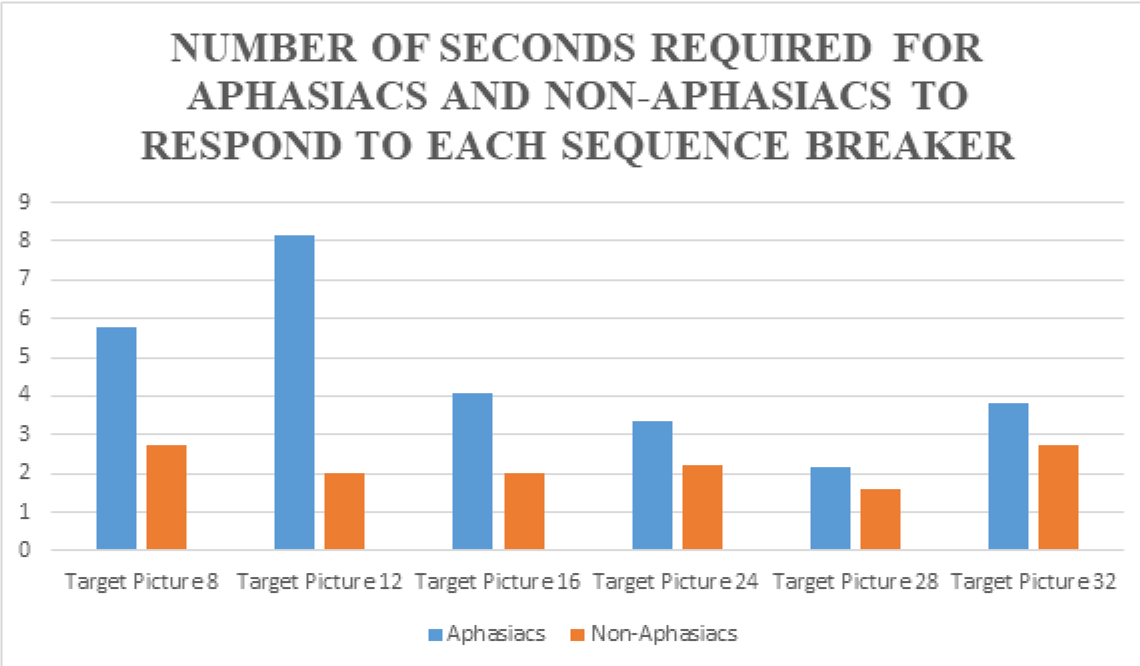

Figure 4. A comparison between the average number of seconds required by aphasiacs and non-aphasiacs to name each sequence-breaking target.

4.5 Evaluation of Quantitative Results

Evidence from my data suggests semantically interrelated sequences assist in the word-retrieval process more effectively than a phonemic or perceptual equivalent. This statement is corroborated by Figure 8, which shows a direct correlation between the disruption of a semantically interrelated pattern and a longer dwell time needed to name the picture that caused it. Although this finding is exaggerated in the Broca's and Wernicke's participants, all aphasiacs, and indeed non-aphasiacs, show at least fine-grained increases in response time for this category of implicit cue. Interestingly, the more severely afflicted aphasiacs answered remarkably quickly to target pictures interjecting perceptual sequences, which discounts any suggestion of their effectiveness in this study. Finally, with the exception of the Wernicke's patient, all other results suggest only a minute time distinction was required between the lexical access of target pictures that followed a phonemic pattern and target pictures that neglected a phonemic pattern.

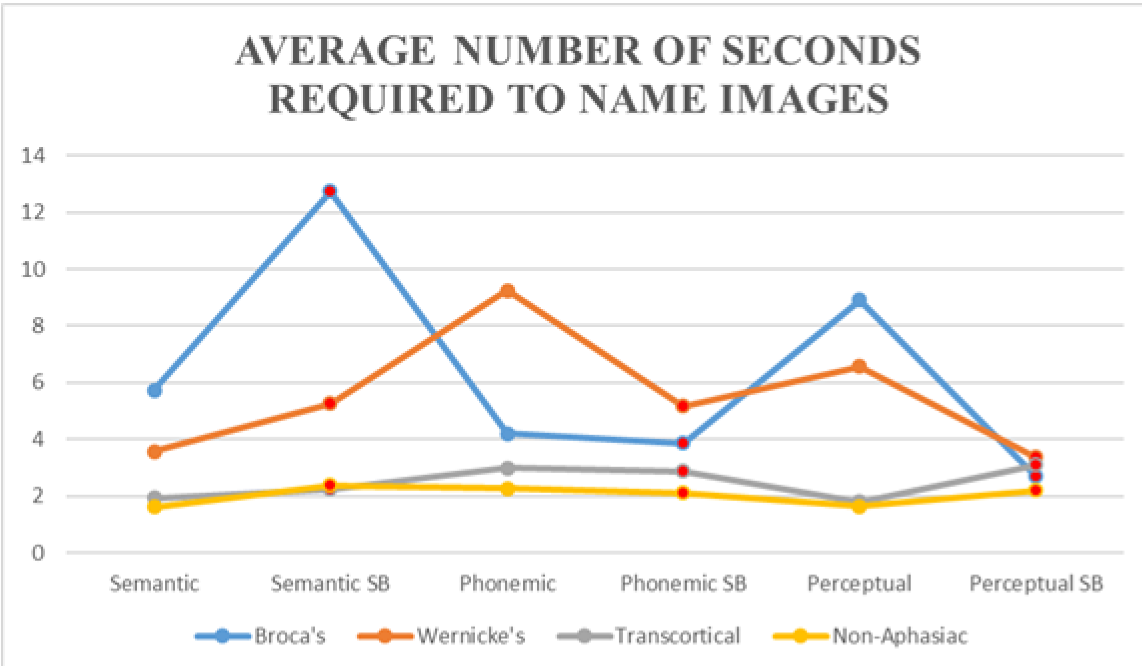

Figure 5. The average number of seconds required for each group of participants to name semantically, phonemically, and perceptual adhering and disruptive images.

5.0 Qualitative Observations

Particular answers shown within my data highlight distinct forms of language disturbances typically experienced by stroke patients, including perseveration, pseudo-word coinage, oral production of orthographically similar terms, and inappropriate overextensions of derivational and inflectional morphology. These miscues exist under the linguistic term paraphasia, described as the “perfect chorea or delirium of words” (Althaus 1877:163).

5.1 Perseveration

Participant B’s response to sequence breaker TP32 could be interpreted as totally perseverative, a linguistic notion defined by Cohen & Dehaene (1998:1641) as “the inappropriate repetition of a preceding behaviour when a new adapted response is expected’’. Although the predictable answer to this image would have been ‘grass’, an approximation of the word ‘fish’ was uttered; a more logically anticipated response to TP13. If we appreciate the mechanism of the scan-copier model (Shattuck-Hufnagel & Klatt 1979), which works by allotting individual phonemes to their corresponding position within a word before deeming it complete, we can appreciate the severity of this intrusive perseverative unit. We can assume that the “checkoff monitor failed” on virtually the entire lexical entity of TP13, before “permitting the repeated production” (Buckingham 1986:206) at a later stage. Such an extreme case could be justified by the research of Buckingham et al. (1979:329) who observed how subjects tend to perseverate “involuntarily, often under conditions of weakness…or out of frustration due to an inability to perform a specific task”. This description is applicable to my experiment, as Participant B had experienced significant difficulties prior to the challenge of naming TP32, in what was already an unfamiliar linguistic situation for the Wernicke’s aphasiac.

TP13 = Fish (2.02)	TP32 = Grass (SB) (4.26)
P = fɪʃ	P = flɪʃ (.) fɪʃ

Figure 6. Participant B’s perseverative response to the stimulus TP32.

Interestingly, these two targets were not positioned locally within the experiment, a finding replicated in similar decontextualized word-retrieval exercises. Martin et al. (1998) proposed an explanation for long-distance perseverations, suggesting a semantic correlation between the terminated image and the latterly misnamed target must be established for them to be prominent. However, similar to Eaton et al. (2010:1017), a study where two jargon aphasiacs' perseverative incidences "could not be explained by semantic relationship", Martin et al.'s answer fails to elucidate a sound reason for the disfluency presented in my data , as 'grass' and 'fish' share little association besides a tentative link to nature.

5.2 Mutual Phonological Features and Related Paraphasias

A vast proportion of miscues uttered by Participant B hold mutual phonological features with the target, which suggest a level of understanding despite impaired execution. For example, the TP30 stimuli elicits a response of /skiːt/, which shares the ɪː phoneme present in the body of /tʃiːzə/. Antithetically there are occasions where the aphasiac retains the peripheral elocution of a word, but has difficulty regarding internal sound, as seen in TP26, where /bɪs/ was produced in response to the visual prompt of a /bʊs/. These errors are consistent with the findings of Ash et al. (2010:13) who observed that, of the 82% of speech errors deemed "phonemic" and elicited by non-fluent aphasiacs in their study, "the majority… were substitutions that shared most distinctive features the target phoneme". Applying this logic, it is notable that the /s/, /t/, and /ʃ/ phonemes present in the earlier example are similarly produced alveolar fricative, alveolar plosive and palato-alveolar fricative articulations respectively. Similarly, the distinction between a production of the vowels /ɪ/ and /ʊ/ is discreet. These systematic errors extend to matters of intonation, as stress placement appeared entirely unaffected despite final answers deviating from what could be considered an accurate response. Based on this line of argument, it would be reasonable to assume the aforementioned errors are current inabilities, not misunderstandings, of producing of the correct form.

5.3 Neologisms

Participant B was adept at spontaneously coining pseudowords, a finding supported by prior researchers' observations regarding the fluent, yet seemingly vacuous nature of speech used by Wernicke's aphasiacs. The most archetypal examples of this were prompted by TP16, /gɪnɒldəgə/, TP 18, /rɒʃ/ and TP23, /kæræ nɒs/. It is believed that "neologisms arise as a result of an accumulation of segmental-phonemic errors which can distort the target word beyond recognition" (Blanken 1993:551), leading to approximations which generally fail to match the desired lexical item "in terms of number of syllables, stress patterns, or consonant clusters" (Pitts et al. 2010:357). The aforementioned examples are linguistically interesting, as peripheral elocution of the intended word remains intact. The answer /gɪnɒldəgə/, elicited in response to the target /gɪtaː/ opens identically until the participant accesses an /n/ phoneme, rather than a /t/, whilst, similarly, the initial phoneme /k/ in /kraʊn/ is correctly identified, but quickly loses accuracy. Otherwise, the pronunciations of /dres/ and /rɒʃ/ share the closing 'esh' phoneme, which substantiates the belief that these are indeed pseudowords, mimicking distinguishable forms, rather than nonsensical entities.

5.4 Orthographical Understanding

In response to the visual stimuli in TP35, Participant B appears to overextend the phonemic patterns of similarly spelt words to the image, despite not being shown the orthographical interpretation of it. Where /beə/ was expected, Participant B immediately answered with a phonologically distinct substitute term, "fɪə". It appears the patient is processing words via a method that defies the commonly held assumption that "spoken language precedes, ontogenetically and phylogenetically, written language" (Bonin et al. 2001:688), as they attempt to overcome a troublesome oral representation by visualizing a written representation of the target word and those spelt similarly to it. This finding is not uncommon within neurolinguistic research, as evidenced by research on the inconsistency of verbal and written responses towards the same stimuli, conducted by Miceli at al. (1997). In this study, an intracerebral haemorrhage victim was shown and asked to name individual targets, and told to supplement this answer by writing its corresponding typographical representation down. 30.8% of images in the "oral-then-written picture naming" exercise were responded to differently between the two language modalities. This would suggest that “orthographic word forms are autonomous from phonological forms” (Miceli et al. 1997:35-36). Knowing how the Wernicke’s aphasiac envisions written words before orally producing them, a language pathologist could encourage ‘speaking aloud’ the letters of a target, with a view to deconstructing it into manageable lexical units and enabling easier identification of the root of an error in oral production.

TP35 = Bear (12.83)

P = (.) frə! (.) eh (.) uhh (.) frəhɔ:s (.) bi:j

Figure 7. An example of the influence of orthographically similar words on Participant B’s oral production of targets.

5.5 Derivational and Inflectional Morphology

Participant B repeatedly altered their response through the derivational morphemes ‘er’ and ‘ness’, whilst additionally, and incorrectly, fixing the inflectional suffix ‘ing’ to a root word. Figure 11 cites the most prominent example from this transcription, where the volunteer named TP7 as /snɔ:tɜ:/ only to change this answer to /snɔ:tɪŋ/ before settling on a decision. Interestingly, in a study of a “severely aphasic” individual’s responses to a word-repetition exercise, Miceli & Caramazza (1988:28) discovered how morphological difficulties constituted for 71.2% of all speech errors, whilst only 3.3% of these were derivational. This implies the existence of /snɔ:tɜ:/ is relatively uncommon.

TP7 = Sun (5.21)

P = snɔ: (.) snɔ:tɜ:? (.) snɔ:t? (.) hmm (.) snɔ:tɪŋ

Figure 8. An example of misapplied suffixes.

To determine whether this paragrammatism is truly uncommon, it is useful to observe similar cases of aphasic grammatical structuring in highly inflectional, fusional languages, such as Hungarian (MacWhinney & Osman-Saqi 1991) and Finnish (Helasvuo et al. 2001). In a sample of German aphasiacs, Bates et al. (2004:292) found that “Wernicke’s are slightly more likely to substitute than omit articles, and their substitution errors reflect their derailed efforts to carry through with more complex and morphologically-marked constructions”. This is indeed evidenced within my data, as Participant B convolutes their answer with a complex, inflected pseudoword, rather than shortening a more legible response. Such a finding could be interpreted to normalise the misapplied suffix shown in Figure 11.

5.6 Retention of Semantic Understanding

Participant A’s capability of accessing words through self-applied semantic feature analysis was clearly retained. The aphasiac recounts understanding that TP34 falls “off a tree”, whilst similar associations were elicited in response to TP8, which “comes in the ground”, and TP4 which is “another type of fruit”. Although Participant A named TP19 as a different subcategorization of sea mammal, this was common within the exercise, with two others labelling the dolphin as a “fish” and three individuals suffering from hesitation or delayed reaction time.

Participant C showed one recurrent linguistic deficit, in that they struggled to access the appropriate noun from within a correctly distinguished semantic category. This was best exemplified in TP20, where the Broca’s patient demonstrated clear understanding that the dice was a component of a board game by suggesting it could be a “domino”, which shares those associations. A similar miscue is seen in response to TP31, where the image of a duck prompted the participant to elicit the answer “rabbit”. Occasionally this inability to refine semantic groups caused the participant to revert to the umbrella term within which the target picture belongs to, such as in TP19 and TP23 where “fish” and “hat” were triggered rather than the respective ideal answers of “dolphin” and “crown”.

TP20 = Dice (7.68)

P = um (.)

R = begins with ‘di:’ (.) ‘daɪ’

P = dɒmɪnəʊ

TP23 = Crown (9.89)

P = (.) hmm (.)

R = begins with ‘si:’ (.) ‘kə’

P = (.) hæt (.) huh?

Figure 9. Instances of Participant C’s incorrect retrieval of targets sourced from within a shared semantic category.

5.7 Telegrammatic Production

Participant A demonstrated a telegrammatic manner of speech, which is symptomatic of a Broca’s aphasiac. Productions were often devised of many self-initiated iterations, for example, the response to TP1 where ‘apple’ develops from the phonetic entities /æ/, /æp/, and eventually /æpəl/ and TP3, which shows the incremental growth of /ɒr/ to /ɒrə/, /ɒrɪn/ and later /ɒrɪdʒz/ as displayed in Figure 13.

TP3 = Orange (9.77)

P = (.) (exhales strongly) ɒ (.) ɒr (.) ɒrə (.) ɒrə (.) ɒrɪn (.)↑ɒrɪdʒz (.)

Figure 10. A transcription depicting Participant A’s telegrammatic production.

A particularly interesting paraphasia from this dataset sees the volunteer incorrectly name a picture where the opening phonemes were successfully uttered, i.e. /daɪsʌn/ instead of the desired answer of /daɪs/. This could be explained as an “addition error”, defined linguistically as “the production of an extra sound to the target sound” which occurs at the “phonetic level” (Halpern & Goldfarb 2013:45), likely caused by an impairment to the dual-route model of speech production. The paradigm details how two independent means of naming, those being the ‘whole word’ and ‘phonological’ route, are used in conjunction by the linguistically unimpaired to “provide information to a phonetic buffer that computes these two inputs in preparation for phonetic-articulatory processing” (Heilman 2006:158). However, damage to one sub-type can significantly increase the probability of speech errors. I would posit that the ‘whole word’ dice was not sufficiently recognised, and the phonological route comprised for lexical absence by attaching a common syllable to the root /daɪ/, which I offered as a verbal cue.

5.8 Disfluencies of Non-aphasic Stroke Patients

Both Participant D and Participant G demonstrate, albeit minor, deviations from the expected answer of a person with no medical history of brain damage, which suggests there is slim possibility of absolute language recovery for a stroke patient. Examples of phonological deviation are noticeable in Participant D's data, where, in response to TP30, /tiːz/ was accessed in substitution for /tʃiːz/. TP31 caused Participant G to inaccurately label a 'duck' as a 'chicken'. The stroke patient possessed similar naming difficulties in other animal-centric targets, specifically when confronted with TP19, where phonemic cues failed to assist in the production of the word 'dolphin'. Despite these examples, Participant D has retained a deep vocabulary and subject knowledge, which appears incomparable with the aphasic contingent of this research project. This is evident in response to TP15, TP21, and TP26, where instead of accessing the umbrella nouns from their mental lexicons i.e. 'flower', 'car' and 'bus' respectively, the stroke patient offers a high level of specificity with the responses 'dahlia', 'taxi' and 'London bus'.

TP15 = Flower (3.58)

P = (.) flower (.) dahlia maybe (.) I don't know

Figure 11. Demonstration of the rich subject knowledge available to non-aphasic stroke patients.

6.0 Analysis of Prompts

Observing the success of different prompting strategies in overcoming word-retrieval difficulties allows a more explicit indication as to the extent to which semantic, phonemic and perceptual assistance is appreciated by aphasiacs.

6.1 Semantic Feature Analysis

It is understood that providing contextual information about a target object to an aphasiac increases the potential of it being named successfully. This is referred to as Semantic Feature Analysis (SFA), a technique whereby lexical access is facilitated by "increasing the level of activation within a semantic network" (Coelho et al. 2000:133). Boyle & Coelho (1995:96) re-directed the application of SFA away from external traumatic brain injuries towards matters of aphasia, subsequently noticing "improved confrontation naming on trained and untrained items" in word-retrieval exercises as a result. Whilst this study required the participants to document semantic associations, Hillis (1989) devised a "cueing hierarchy" which the experimenter would use to elicit themes connected to the target. Amongst the paradigms suggested to the researcher are "verbal sentence completion" e.g. "the driver parked his…" and "function provided" e.g. "you wear them on your feet". Having applied semantic cueing in my experiment, I am able to advocate their use in further therapy sessions. To illustrate this, Participant A hesitated for 5.42 seconds on TP6, a depiction of rain, before I worked to broaden the semantic associations to the word by detailing how the picture was a "type of weather" which "comes down". The Broca's patient was assertive in their response, repeating the target word thrice in quick succession to indicate their familiarity with the picture. Elsewhere, semantic cues were used to aid Participant B, a long time Wernicke's aphasiac, where they appeared frustrated with an inability to name TP33. To interrupt an 11.83 second pause post-onset of the target, I explained the function of the object, "you eat it" and defined its taste with "it's quite sweet". The volunteer responded in a dramatically reduced time of 1.23 seconds with the pseudo-word "loterate", which is phonetically close to "chocolate", making it reasonable to assume that noun was their desired answer.

6.2 Opening Phoneme Production

Besides SFA, I utilized phonemic cues where difficulties occurred articulating the beginning of a target word. This technique was adapted from the educational linguistics approach to child reading development named ‘analytic phonics’. Typical application of the strategy would involve a teacher or ‘more knowledgeable other’ (Vygotsky 1989) emphasizing the first letter of a target word, with the intention of pupils memorizing signs or ‘whole units’ (McBride-Chang 2004:120) rather than learning to discriminate phonemes within a word. Although the notion was accused of de-emphasizing learning, implementation in the context of my experiment is justified, as aphasiacs, unlike young readers, have been exposed to, and wielded themselves, a wide vocabulary prior to the exercise they’re participating in, and are more likely to recall lexical items from within their subconscious. Opening phoneme production has been trialled in previous neurolinguistic literature, most notably in a study focusing on the effects of 4 independent cueing strategies on 20 Broca’s aphasiacs, “presentation of the initial syllable of the word ranked second” (Love & Webb 1977:170). Similarly, Pease and Goodglass (1978:178), in a trial of Broca’s, Wernicke’s and anomic aphasiacs, discovered “first sounds” to be the joint most effective cue along with “completion sentences”. Having personally evaluated the effect of such a technique, it would appear the successfulness of phonemic prompts is extended to my study. This was most evident in the Transcortical Motor aphasiac’s near-immediate ability to retrieve lexical items following the presentation of a phonemic cue. Participant E required an uncharacteristically lengthy 14.59 seconds to posit the suggestion ‘fish’ in response to TP19, at which point I offered the verbal prompt “begins with /diː/”. Following this interjection, the aphasiac produced the more precise answer of “dolphin” within 1.56 seconds. A markedly similar anomic instance is seen in Participant F’s response to the same target picture, where a pause of 7.85 seconds was punctured by a retrieval time of 1.03 seconds following the help of an identical phonemic cue.

Before the study I conjectured that phonemic cues would lend themselves favourably to Broca’s patients, as there are parallels between how an experimenter articulates an opening phoneme to be completed, and the characteristically telegrammatic manner of speech this group possess.

However, in practise, these prompts were met with mixed success by Participant A. TP20, an image of a dice, caused difficulties for the volunteer who remained silent for 6.03 seconds before I attempted to trigger a response through the production of sounds /d/ and /daɪ/. The Broca's patient enthusiastically produced the verbalisations /daɪ/ and /daɪs/ within 1.77 seconds as result, and despite unnecessarily overextending the stem to form /daɪsʌn/. I believe the cue stimulated a memory of the verbal representation of the word they were aiming for. In contrast, there are occasions in Participant A's data where phonemic prompting failed to culminate in a correct answer. For example, after an extensive period of deliberation required to attempt naming the crown picture in TP23, I suggested the opening syllable /k/, followed by an almost complete production of /kraʊ/ as uncertainty persisted. This offering was met by the Participant A's suggestion /ʤuːns/, which I believe to be an approximation of the word "jewels". As the consonant /k/ is a velar plosive and /dʒ/ is a significantly dissimilar palato-alveolar affricative, I cannot substantiate claims that my cue was effective.

6.3 Evaluation of Verbal Prompts

Despite the apparent overall efficaciousness of this remediation strategy, Howard et al. (1985:819) inform therapists how "techniques that provide the patient with information about the phonological form of the picture name have effects… that disappear entirely within a few minutes". I believe the singular nature of my experiment may promote phonemic cues. However, for cumulative, long-lasting improvement, especially with extemporaneous speech, I would advise the application of semantic prompts to assist word-retrieval.

7.0 Discussion

This chapter presents the opportunity to revisit neurolinguistic literature which influenced the development of this dissertation, and determine whether my aforementioned findings endorse or refute the key arguments within the field. Additionally, I will discuss my study in relation to wider language use.

Within this branch of linguistics, palpable support had been assigned to therapeutic approaches where broadening the semantic associations of a word were centric to circumventing anomia (Boyle & Coelho 1995). As previously noted, Magesh & Shanker Patil (2013) found the treatment particularly effective for Broca's aphasiacs, and this observation was extended to my study. The Broca's contingent experienced the greatest difficulty in naming semantic sequence-breakers, as judged by the difference in response times registered towards conforming and non-conforming targets, which I deemed a key indicator of receptivity. Additionally, I found Hillis' (1989) semantic cueing hierarchy to function as a highly successful tool, providing options which allowed me to alter my verbal assistance where required. Of all recognised semantic properties, acknowledging the 'function' of a common noun proved resoundingly effectual, as is evidenced by Participant B's response to TP33 and Participant A's response to TP6, amongst others.

Other theorists chose to investigate and subsequently grant salience to the use of phonemic prompts to treat aphasic word-retrieval. Love & Webb (1977) and Bruce & Howard (1987) both focused on the responsivity of Broca's aphasiacs to initial syllable production, and both deemed the technique successful, only ousted by actual presentation of a word as the most valuable cues available to therapists. Participants A & C of this study, both afflicted by this branch of the pathology, performed comparably at the onset of adhering and non-adhering images, which fails to corroborate the findings of the aforementioned linguists. Comparison to the work of Pease & Goodglass (1978), who assigned vehement support to phonemic prompts in their experiment, which included Wernicke's aphasiacs, highlights further unexpected disparities. Participant B, the equivalent Wernicke's patient in my study, named disruptive images in this category markedly quicker than those which abided the pattern. However, it is important to consider that offering the opening syllable of a word, when interjecting with verbal assistance after noticing mental fatigue or frustration, had a positive effect on all participants. This indicates that explicit phonemic prompts operate more effectively than implicit equivalents.

The research of Bisiach (1966) and Benton et al. (1972) gave rise to the assertion that carefully selected perceptual characteristics, such as colour, dimension and photorealism, can co-operate to negate the possibility of anomia. Despite this, response times posted towards perceptual stimuli in my study highlighted an adverse effect, with all Broca's and Wernicke's aphasiacs instead naming non-adhering targets faster than sequential counterparts. There is no prerequisite for similarly coloured objects to also share a function, physical characteristic, or typical location within the world. This led to my associated targets ranging from hearts, to buses, to roses, which are unlikely to be automatically connected in situations besides my experiment. This weak association is exaggerated when juxtaposed by our collective tendency to categorise by semantic features, for instance segmenting food groups or animal types into subsidiary headings, and the commonality of phonemic associations in society, such as the preponderance of alliterative marketing campaigns. I believe, by contextualising the experiment in relation to language external to the dissertation, the poor performance of perceptual prompts in my dissertation is justified. It should be stated that my findings do not diminish the importance and validity of literature surrounding perceptual prompts for aphasiacs, but simply fail to substantiate them to a considerable degree.

Prior to conducting the experiment, I anticipated the majority of participants to offer responses which could be classified, however minor, as perseverative. This expectation arose from the findings of Corbett et al. (2008) and Yamadori (1981) who mitigated any assumptions that the speech condition was uncommon. Contrary to this, only one of five aphasiacs gave a repeated answer culminating from a lack of acceptance towards the cessation of a preceding target. Linguists have previously attempted to explain the cause of perseverative responses, however the prominent suggestion, argued by Martin et al. (1998), that residual answers often carry a definite semantic connection to a previously terminated articulation, failed to hold true in this study. Instead, Buckingham's (1979) proposal, which considers frustration, fatigue and unfamiliarity of task as catalysts for perseveration, is supported by my data. I encountered various other paraphasias and related language disturbances which were not accounted for in my literature review. Amongst these, neologisms were the most prevalent and they appeared almost exclusively in the Wernicke's aphasiac's data. Pitts et al. (2010) noticed how coined pseudo-words distinguished themselves apart from desired words by syllables and stress; however, this was not entirely consistent with my findings. Participant B often retained the peripheral sounds of the target they attempted to access, but wildly dissimilar internal speech sounds manipulated their efforts away from an identifiable standard.

Otherwise, the tendency for Participant B to inflect responses they appeared uncertain towards the validity of was a repeated finding from pre-existing studies into the morphology of aphasic speech. Bates et al. (2004) theorised that Wernicke's patients were considerably more likely to substitute phonemes which caused them difficulties with phonemes they were familiar with, rather than leave the position entirely vacant. My finding offers support to this assertion, as the participant appeared far more willing to overextend a pronunciation with redundant inflections than leave a word remiss of its accepted number of syllables. Similarly engaging disfluencies in my data were explained and normalised by existing literature, such as the telegrammatic manner of Broca's aphasic production (Halpern & Goldfarb 2013), the effect of orthography on verbal speech (Miceli et al. 1997) and inaccurate sound replacements (Ash et al. 2010).

8.0 Conclusion

In summary, my dissertation attempted to identify and encourage the application of semantic, phonemic or perceptual prompts, to speech therapists working closely with aphasiacs who typically experience naming difficulties. To achieve this, I collated images into patterns corresponding to the three aforementioned categories, and duly placed two non-adhering targets within each of these sequences. Importantly, I hypothesised that a longer dwell time on a sequence-breaking target was indicative of receptivity towards the pattern which terminated at the point of its interjection. Equally, the dissertation wished to highlight linguistically compelling paraphasias which were present within the data, and draw comparisons with pre-existing literature to suggest a rationale behind their occurrence.

In evaluation of my findings, I have deduced that lexical priming through semantically interrelated images help overcome anomic episodes in a more obvious manner than phonemic and perceptual equivalents. This judgement was reached based on the average number of seconds needed to process sequence-breakers, in addition to the aphasiacs' acceleration in word-retrieval having been primed of a semantic, phonemic or perceptual association within the pattern. Tellingly, the disruption of a semantic sequence affected the reaction times of Broca's, Wernicke's, Transcortical Motor and non-aphasiac participants alike, despite variation in the severity of their impact. Whilst times registered in response to phonemically interjectory targets were largely similar to standard phonemically adhering images, the sequence breakers performing in perceptual sequences contributed to an unexpected result, in that Wernicke's and Broca's patients dwelled longer on conforming images than those intended to pose naming difficulties.

Where the participants of this study appeared frustrated or to suffer from mental fatigue, I would offer verbal prompts to assist their word-retrieval. Incrementally building the full pronunciation of a word, beginning with the opening phoneme, proved largely effective for Transcortical Motor aphasiacs, whilst Semantic Feature Analysis had a comparably beneficial impact on the Broca's and Wernicke's patients. Through secondary research, I discovered vehement support for the view that semantic cues offer a longer-lasting rehabilitative effect than a phonemic alternative.

Common paraphasias were found within the data, such as long-distance perseverations, neologisms, internal sound substitution, inappropriate application of derivational and inflectional morphology, and verbal production of orthographically similar non-target words. Whilst these miscues were most prominent in Participant A and Participant B's transcriptions, their presence in non-aphasic stroke patients, irrespective of the subtlety with which they were exhibited, adds weight to the suggestion that full language recovery is borderline unattainable for haemorrhage victims.

Whilst non-aphasic participants displayed markedly faster response times to all stimuli, they were deemed less intensely affected by intentional priming than their aphasic counterparts were. This is reasoned by the fact that on only one occasion did a linguistically unimpaired speaker become progressively faster in their response times as a sequence progressed. By comparison, the aphasiacs proved four times more likely to be classified as receptive to the sequences.

Considering my observations, I advocate for the therapeutic approach of using semantically associated targets to assist in overcoming anomia in aphasic speakers. This could be applied in a number of ways, although I would recommend language pathologists collaborate with the aphasiac to broaden the associations of the troublesome word, rather than simply stating those associations to the patient. This could include asking for the function of the noun, the location or setting within which it is commonly found, a description of its appearance, or, alternatively, any identifiable traits it may have, such as a distinguishable sound, taste or smell. Creating picture cards of items established under a mutual category, similar to those used in this experiment, appear to be equally useful instruments to trigger lexical retrieval. Alternatively, direct replication of the study, but administered longitudinally, would grant a higher degree of certitude to the results. It would also be profitable for fellow practitioners to build upon this research by investigating the role of semantic, phonemic and perceptual relationships for word-retrieval in extemporaneous speech. This could be achieved by requesting aphasiacs describe a typical farmyard setting, utter a list of rhyming words, or create a scenario using characters with a mutual visual characteristic. The variation in fluency of these tasks could help decipher which self-triggering mechanism needs specific rehabilitation.

Although the experiment proved highly successful, certain factors could be readdressed, both in relation to organisation and in relation to execution, which would increase the validity of my final judgement, and should be considered were a future research interested in replicating the study. The clearest limitation of this study was the inaccessibility of a large number of aphasiacs, with my small sample possibly compromising the generalizability of results. However, due to the sensitive nature of their pathology, I remain convinced that building up a rapport with a stable group of stroke survivors through repeat visits was the more ethically considerate means of attaining truly consenting and willing participants. Besides this, the possibility of progressive mental fatigue distorting the response times represented a notable challenge to the reliability of results. To counteract tiredness, I included blank sides between each set of four targets, and stressed to the participants that these indicated a rest period. Nonetheless, the aphasiacs appeared eager to resume the experiment almost immediately. Another potential blemish on my dissertation would be the efficiency issues associated with my method of recording response times. Although highly accurate, having applied both a Sony ICD-PX240 Digital Voice Recorder and Microsoft PowerPoint audio recording to capture the naming exercise, the extortionate amount of time required to check two devices for precision purposes could be mitigated. One means of accelerating the analysis process would be through installing voice recognition software onto a laptop, which would automatically proceed to a resultant target once the current target has been named successfully. However, I persevere with the belief that incremental production of words, as commonly exhibited by Broca's aphasiacs in particular, could cause the presentation to incorrectly judge incomplete speech sounds as full lexical items, and prematurely skip ahead to a proceeding image.

To conclude, by conducting primary research across three aphasia subtypes, this dissertation offers support to linguists who encourage the application of semantic priming, both implicitly and verbally, to overcome a haemorrhage victim's anomic instances.

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11.0 Appendices

KEY

TP = Target Picture

SB = Sequence Breaker

P = Participant

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

11.1 Transcription i: Participant A

Age: 55

Length of Time since Stroke: 2 Years

Aphasia Subtype: Broca's

TP1 Apple (3.18)

P a (.) app (.) apple (.) apple (.)↑an apple

TP2 Banana (21.15)

P (.) I (.) I just done about them with those (referencing conversation amidst group therapy session) uhh (.) an (.) an (.) banar (.) banana (.) banana (.)

TP3 Orange (9.77)

P (.) (exhales strongly) ɒ (.) ɒr (.) ɒrə (.) ɒrə (.) ɒrɪn (.)↑ɒrɪdʒz (.)

TP4 Strawberry (31.58)

P (.)

R	it’s another type of fruit

P	yes (.) oh (.) uhh (.)

R	we can skip if you don’t know at all (.) that’s fine (.)

P	straw! strawbs (.) s (.) s (.) s (.)↑strawberries (.) strawberries

TP5	Snow (4.23)

P	(.) cloud (.) cloud (.)

TP6	Rain (6.59)

P	(.) a t (.)

R	A type of weather (.) comes down

P	rain (.) rain (.) rain

TP7	Sun (3.13)

P	Sun

TP8	Carrot (SB) (15.44)

P	(.) oh (.) ugh (1) I don’t like ‘um! (.) uhhh (.) come in the ground (.)

R	uh huh

P	carrots↑ carrots

TP9	Cow (2.78)

P	a cow

TP10	Horse (4.74)

P (.) horse

TP11 Pig (4.41)

P (.) pig

TP12 Aeroplane (SB) (28.95)

P (.) an eh (.) eh (.) eh (.) eh (.) eth (.) app (.) appul (.)

R air (.)

P airpul (.) app (.) appul (.)

R aero (.)

P aerop (.) aeroplane (.) aeroplane

TP13 Fish (1.22)

P (.) fish

TP14 Feather (5.31)

P (.) Haven’t got a clue (laughs)

TP15 Flower (2.67)

P flower

TP16 Guitar (SB) (4.28)

P (.) gi (.) guitar

TP17 Dog (1.89)

P (.) a dog

TP18 Dress (3.53)

P (.) a dress

TP19 Dolphin (7.27)

P (.) uh (.) a whale

TP20 Dice (7.80)

P (.)

R begins with ‘du’ (.) ‘du’ (.) ‘die’

P die (.) die (.) dice (.) dyson (.) dyson (.) not dyson (.) dyson (.) dyson?

TP21 Car (1.49)

P (.) a car

TP22 Cake (2.70)

P (.) cake

TP23 Crown (14.14)

P (.) ohhh (.)

R begins with ‘ku’ (.) ‘ku’ (.) crowh (.) crowh (.)

P j (.) j (.) jewns (.) jewns (.)

TP24 Lion (SB) (1.81)

P (.) lion

TP25 Tomato (5.65)

P (.) ohhh (.) tomatuz

TP26 Bus (2.53)

P (.) a bus

TP27 Heart (3.80)

P (.) heart

TP28 Football (SB) (2.38)

P (.) football

TP29 Lemon (5.31)

P (.) haven't got a clue (waves hand indicating a wish to skip)

TP30 Cheese (1.54)

P cheese

TP31 Duck (3.21)

P (.) a duck

TP32 Grass (SB) (3.56)

P (.) grass

TP33 Chocolate (10.85)

P (.) ohhh (.) cho (.) choc (.) choclut↑ (.) choclut

TP34 Acorn (15.54)

P (.) ohh I know what it is but (.) on a (.) off a tree (.) off a tree it's err (.)

R brown (2) ay (.) ay (.)

P ay (.) ay (.) ay (.) acorn (.) acorn (.) acorn↑

TP35 Bear (1.66)

P bear

TP36 Table (6.01)

P errr (.) table

KEY

11.2 Transcription ii: Participant B

Age: 77

Length of Time since Stroke: 2 Years

Aphasia Subtype: Wernicke's

TP = Target Picture

SB = Sequence Breaker

P = Participant

R = Researcher

(./x) Pause

↑ = Rise in Intonation

TP1	Apple (2.71)
P	apple
TP2	Banana (1.99)
P	banana

TP3 Orange (5.22)

P (.) orange

TP4 Strawberry (2.29)

P scor (.) strawberry

TP5 Snow (6.61)

P (.) that's snow

TP6 Rain (4.56)

P ril (.) err (.) rain?

TP7 Sun (5.21)

P snɔː (.) snɔːtɜː? (.) snɔːt? (.) hmm (.) snɔːtɪŋ

TP8 Carrot (SB) (5.24)

P (.) carrot

TP9 Cow (3.68)

P (.) cow

TP10 Horse (1.90)

P sorgness

TP11 Pig (1.57)

P (.) pig

TP12 Aeroplane (SB) (4.26)

P (.) plane?

TP13 Fish (2.02)

P fɪʃ

TP14 Feather (35.78)

P (.)

R begins with ‘eff’ (.) fuh (.) fuh (.)

P fuh (.) fuh (.) fen? (.) fen? (.)

R fev (.) fev (.)

P fes (.) no (.) I know what you’re saying but (.) fev (.)

R fev (.)

P ferry (.) just gotta act right (.) hmm

R we can pass if you want to? (.) skip that one?

P can you go another one a minute?

R yeah, of course

TP15 Flower (22.26)

P f (.) frish (.) fry (.) hmm (.)

R flowh

P flous (.) hmm (.) I know that one (.) ugh

R we can skip if you want to

P	yeah, just go again

TP16	Guitar (SB) (4.76)

P	(.) oh (.) g (.) ginoldager?

TP17	Dog (2.52)

P	got

TP18	Dress (2.09)

P	rosh

TP19	Dolphin (3.40)

P	oliphing

TP20	Dice (6.59)

P	dos (.) d (.) dice↑

TP21	Car (3.63)

P	(.) car

TP22	Cake (9.13)

P	jjjjju

R	ku (.) ku (.)

P	cosh (.) col↑ yeah

TP23	Crown (4.72)

P	caranos? (.) kenni

TP24 Lion (SB) (5.54)

P lion

TP25 Tomato (2.30)

P (.) tomato

TP26 Bus (4.38)

P (.) biss

TP27 Heart (8.60)

P h (.) hearto (.) no (.) can I do (.) hearting?

TP28 Football (SB) (2.47)

P football

TP29 Lemon (2.45)

P (.) lemur

TP30 Cheese (5.09)

P (.) ski (.) ski (.) skeet (.) skeet

TP31 Duck (4.25)

P duck!

TP32 Grass (SB) (4.26)

P flɪʃ (.) fɪʃ

TP33 Chocolate (13.06)

P (.)

R you eat it (.) it’s quite sweet (.) brown

P (.) loterate

TP34 Acorn (5.46)

P (.) ahorn

TP35 Bear (12.83)

P (.) fıə! (.) eh (.) uhh (.) fıəhɔːs (.) biːj

TP36 Table (7.15)

P sorry (.) sol (.) sol

KEY

11.3 Transcription iii: Participant C

Age: 68

Length of Time since Stroke: 8 Years

Aphasia Subtype: Broca's

TP = Target Picture

SB = Sequence Breaker

P = Participant

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

TP1 Apple (1.33)

P (.) a (.) apple

TP2 Banana (1.31)

P (.) banana

TP3 Orange (1.39)

P (.) orange

TP4 Strawberry (2.00)

P strawberry

TP5 Snow (4.16)

P (.) c (.) cloud

TP6 Rain (2.75)

P rain

TP7 Sun (3.38)

P (.) s (.) sunshine

TP8 Carrot (SB) (3.78)

P (.) car (.) rot

TP9 Cow (1.80)

P cow

TP10 Horse (2.00)

P horse

TP11 Pig (2.82)

P (.) pig

TP12 Aeroplane (SB) (2.82)

P (.) plane (laughs)

TP13 Fish (2.05)

P (.) fish

TP14 Feather (3.28)

P (.) fedder

TP15 Flower (3.17)

P (.) flower

TP16 Guitar (SB) (6.45)

P (.) guitar

TP17 Dog (2.29)

P (.) dog

TP18 Dress (1.89)

P (.) dress

TP19 Dolphin (2.38)

P fish

TP20 Dice (7.68)

P um (.)

R begins with ‘diː’ (.) ‘daɪ’

P dɒmɪnəʊ

TP21 Car (1.19)

P car

TP22 Cake (2.28)

P (.) cake

TP23 Crown (9.89)

P (.) hmm (.)

R begins with ‘siː’ (.) ‘kə’

P (.) hæt (.) huh?

TP24 Lion (SB) (2.82)

P (.) liar

TP25 Tomato (3.66)

P (.) tomato

TP26 Bus (2.14)

P (.) bus

TP27 Heart (2.09)

P heart

TP28 Football (SB) (2.49)

P football

TP29 Lemon (4.56)

P (.) err (.) not tangerine (laughs) lime

TP30 Cheese (1.01)

P (.) cheese?

TP31 Duck (11.62)

P (laughs and shrugs shoulders)

R yellow (.) ‘quack quack’

P rabbit?

TP32 Grass (SB) (2.25)

P oh (.) grass

TP33 Chocolate (1.52)

P (.) chocolate

TP34 Acorn (5.43)

P (.) corn

TP35 Bear (4.86)

P (.) bi (.) bear

TP36 Table (2.27)

P table

KEY

11.4 Transcription iv: Participant D

TP = Target Picture

Age: 64

SB = Sequence Breaker

Length of Time since Stroke: 9 Years

P = Participant

Aphasia Subtype: N/A

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

TP1 Apple (1.29)

P (.) apple

TP2 Banana (1.11)

P banana

TP3 Orange (2.04)

P orange

TP4 Strawberry (2.27)

P (.) strawberry

TP5 Snow (4.61)

P rainclou- oh no! snowflakes

TP6 Rain (1.72)

P (.) rainclouds

TP7 Sun (2.12)

P (.) full sun

TP8 Carrot (SB) (5.19)

P (laughs) what's that gotta do with weather? carrot

TP9 Cow (2.35)

P (.) cow

TP10 Horse (2.62)

P (.) horse

TP11 Pig (1.95)

P pig

TP12 Aeroplane (SB) (3.52)

P (.) plane

TP13 Fish (4.30)

P (.) a pink fish (.) not seen many of those

TP14 Feather (3.33)

P feather

TP15 Flower (3.58)

P (.) flower (.) dahlia maybe (.) I don’t know

TP16 Guitar (SB) (3.28)

P guitar

TP17 Dog (2.90)

P dog

TP18 Dress (2.62)

P (.) dress?

TP19 Dolphin (5.61)

P (.) err (.) dolphin (.) is it?

TP20 Dice (2.19)

P dice

TP21 Car (3.63)

P (.) car (.) could be a taxi

TP22 Cake (2.40)

P (.) cake (.) is it in alphabetical order?

TP23 Crown (3.28)

P crown

TP24 Lion (SB) (4.15)

P (.) a lion

TP25 Tomato (3.18)

P (.) tomato

TP26 Bus (3.03)

P bus (.) a London bus

TP27 Heart (2.40)

P heart (.) they're all red! (laughs)

TP28 Football (SB) (3.13)

P (.) football

TP29 Lemon (1.01)

P lemon

TP30 Cheese (3.20)

P tease

TP31 Duck (2.30)

P (.) a duck

TP32 Grass (SB) (5.91)

P (.) something green that’s growing (.) grass

TP33 Chocolate (2.51)

P (.) chocolate

TP34 Acorn (3.18)

P (.) acorn

TP35 Bear (3.81)

P (.) bear

TP36 Table (4.38)

P (.) table

KEY

11.5 Transcription v: Participant E

TP = Target Picture

Age: 62

SB = Sequence Breaker

Length of Time since Stroke: 12 Years

P = Participant

Aphasia Subtype: Transcortical Motor

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

TP1 Apple (1.29)

P (.) apple

TP2 Banana (2.09)

P banana

TP3 Orange (1.31)

P orange

TP4 Strawberry (1.85)

P (.) strawberry

TP5 Snow (6.54)

P (.) uhh (.) snow

TP6 Rain (2.09)

P (.) rain

TP7 Sun (1.29)

P sun

TP8 Carrot (SB) (2.54)

P carrot

TP9 Cow (1.04)

P (.) cow

TP10 Horse (1.77)

P (.) horse

TP11 Pig (1.76)

P pig

TP12 Aeroplane (SB) (2.15)

P (.) plane

TP13 Fish (0.96)

P fish

TP14 Feather (3.25)

P (.) wh (.) what's that (.) oh a feather

TP15 Flower (2.78)

P (.) flower

TP16 Guitar (SB) (1.97)

P guitar

TP17 Dog (0.92)

P (.) dog

TP18 Dress (1.84)

P (.) dress

TP19 Dolphin (16.15)

P (.) fish (.) ohh (.) them things that they ride on

R begins with “dee”

P dolphin

TP20 Dice (0.94)

P dice

TP21 Car (1.27)

P car

TP22 Cake (2.44)

P (.) cake

TP23 Crown (2.14)

P (.) crown

TP24 Lion (SB) (5.61)

P (.) ti (.) no not a tiger is it (.) lion

TP25 Tomato (1.37)

P (.) tomato

TP26 Bus (1.74)

P a bus

TP27 Heart (2.10)

P heart

TP28 Football (SB) (1.66)

P (.) football

TP29 Lemon (1.24)

P (.) lemon

TP30 Cheese (3.65)

P (.) cheese

TP31 Duck (0.96)

P duck

TP32 Grass (SB) (7.22)

P (.) grass?

TP33 Chocolate (1.85)

P (.) chocolate

TP34 Acorn (2.29)

P (.) acorn

TP35 Bear (1.37)

P (.) bear

TP36 Table (2.12)

P (.) table

KEY

11.6 Transcription vi: Participant F

TP = Target Picture

Age: 77

SB = Sequence Breaker

Length of Time since Stroke: 2 Years

P = Participant

Aphasia Subtype: Transcortical Motor

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

TP1 Apple (1.48)

P (.) an apple

TP2 Banana (1.22)

P (.) an banana

TP3 Orange (0.92)

P orange

TP4 Strawberry (2.77)

P (.) strawberry

TP5 Snow (4.98)

P (.) is that a clow (.) cloud?

TP6 Rain (1.27)

P rainclouds

TP7 Sun (1.27)

P (.) sunshine

TP8 Carrot (SB) (1.82)

P (.) carrot

TP9 Cow (1.64)

P (.) oh a cow

TP10 Horse (0.94)

P (.) horse

TP11 Pig (1.08)

P (.) pig

TP12 Aeroplane (SB) (2.45)

P (.) aeroplane

TP13 Fish (1.96)

P (.) fish

TP14 Feather (1.94)

P (.) feather

TP15 Flower (2.14)

P flower

TP16 Guitar (SB) (2.87)

P (.) guitar

TP17 Dog (1.26)

P (.) dog

TP18 Dress (1.91)

P (.) dress

TP19 Dolphin (8.88)

P (.)

R begins with “dee”

P dolphin

TP20 Dice (1.76)

P (.) er (.) dice

TP21 Car (2.67)

P (.) car

TP22 Cake (1.19)

P cake

TP23 Crown (3.22)

P (.) er (.) crown

TP24 Lion (SB) (0.97)

P (.) lion

TP25 Tomato (1.26)

P (.) tomato

TP26 Bus (1.34)

P (.) bus

TP27 Heart (1.12)

P heart

TP28 Football (SB) (1.79)

P (.) football

TP29 Lemon (1.16)

P (.) lemon

TP30 Cheese (1.62)

P (.) cheese

TP31 Duck (1.81)

P (.) duck?

TP32 Grass (SB) (1.74)

P (.) grass

TP33 Chocolate (1.56)

P (.) chocolate

TP34 Acorn (2.45)

P (.) acorn

TP35 Bear (3.16)

P (.) bear

TP36 Table (1.86)

P (.) table

KEY

11.7 Transcription vii: Participant G

TP = Target Picture

Age: 74	SB = Sequence Breaker
Length of Time since Stroke: 10 Years	P = Participant
Aphasia Subtype: N/A	R = Researcher
	(./x) = Pause
	↑ = Rise in Intonation

TP1	Apple (0.71)
P	a (.) apple
TP2	Banana (0.88)
P	banana
TP3	Orange (1.06)
P	orange
TP4	Strawberry (0.96)
P	(.) st (.) strawberry
TP5	Snow (5.11)
P	(.) balloons?
TP6	Rain (0.93)
P	(.) clouds
TP7	Sun (1.09)

P (.) sun

TP8 Carrot (SB) (1.81)

P (.) carrot

TP9 Cow (0.78)

P cow

TP10 Horse (1.09)

P horse

TP11 Pig (1.21)

P pig

TP12 Aeroplane (SB) (1.57)

P (.) aeroplane

TP13 Fish (0.71)

P fish

TP14 Feather (1.07)

P air

TP15 Flower (0.92)

P flower

TP16 Guitar (SB) (1.44)

P (.) guitar

TP17 Dog (0.66)

P (.) dog

TP18 Dress (1.09)

P dress

TP19 Dolphin (15.44)

P erm (.) ohhh (.) it's not a whale but it might be a whale (.) it's the other one (.) can't think of it

R 'du'

P no (.) can't think of it

TP20 Dice (0.86)

P dice

TP21 Car (0.94)

P (.) car

TP22 Cake (1.32)

P (.) cake

TP23 Crown (0.63)

P (.) crown

TP24 Lion (SB) (1.78)

P (.) lion

TP25 Tomato (0.83)

P (.) tomato

TP26 Bus (0.77)

P bus

TP27 Heart (0.91)

P heart

TP28 Football (SB) (0.82)

P a football

TP29 Lemon (0.94)

P lemon

TP30 Cheese (0.96)

P (.) cheese

TP31 Duck (1.76)

P (.) chicken

TP32 Grass (SB) (1.44)

P (.) grass

TP33 Chocolate (0.77)

P (.) chocolate

TP34 Acorn (1.34)

P (.) acorn

TP35 Bear (0.87)

P bear

TP36 Table (0.71)

P table

KEY

11.8 Transcription viii: Participant H

TP = Target Picture

Age: 74

SB = Sequence Breaker

Length of Time since Stroke: N/A

P = Participant

Aphasia Subtype: N/A

R = Researcher

(./x) = Pause

↑ = Rise in Intonation

TP1	Apple (0.84)
P	an apple
TP2	Banana (1.24)
P	(.) a banana
TP3	Orange (0.81)
P	an orange
TP4	Strawberry (1.37)
P	(.) a strawberry
TP5	Snow (3.71)
P	snowflakes
TP6	Rain (0.94)

P rain (.) drops

TP7 Sun (1.34)

P sunshine

TP8 Carrot (SB) (1.16)

P (.) a carrot

TP9 Cow (0.76)

P a cow

TP10 Horse (0.79)

P a horse

TP11 Pig (0.77)

P a pig

TP12 Aeroplane (SB) (0.99)

P (.) an aeroplane

TP13 Fish (1.06)

P a fish

TP14 Feather (1.01)

P a feather

TP15 Flower (1.04)

P a flower

TP16 Guitar (SB) (1.32)

P (.) a guitar

TP17 Dog (0.86)

P a dog

TP18 Dress (0.79)

P (.) a dress

TP19 Dolphin (1.02)

P a dolphin

TP20 Dice (1.14)

P a dice

TP21 Car (1.16)

P a car

TP22 Cake (1.04)

P a birthday cake

TP23 Crown (0.86)

P a crown

TP24 Lion (SB) (0.74)

P (.) a lion

TP25 Tomato (1.03)

P tomato

TP26 Bus (1.21)

P (.) a double decker bus

TP27 Heart (0.89)

P a heart

TP28 Football (SB) (0.92)

P a football

TP29 Lemon (1.31)

P a lemon

TP30 Cheese (1.07)

P cheese

TP31 Duck (0.89)

P (.) a duck

TP32 Grass (SB) (0.87)

P (.) grass

TP33 Chocolate (0.81)

P chocolate

TP34 Acorn (1.04)

P acorn

TP35 Bear (1.17)

P a bear

TP36 Table (0.86)

P a table

11.9 Participant Information Sheet

Information Sheet

Introduction

Thank you for agreeing to discuss my university dissertation. I have specifically invited you to participate, as my sole purpose of the exercise is to determine appropriate speech therapy techniques for those recovering from stroke-induced aphasia.

What is your role?

You will be asked to name 36 pictures of everyday nouns in your own time. Once each set of 4 images have been labelled, you are allowed an interval if you require it. Each image will be uncovered individually and displayed largely on a laptop screen. If you would feel more comfortable looking at flashcards, the exercise is also available in a physical format. The aim of the investigation will remain concealed until you have completed the naming exercise, otherwise responses may be unnatural. If you wish to abandon the test at any given time you may do so with no repercussions or explanations needed. In this case, all data will be disposed of accordingly.

Where does my data go?

All your responses will be stored anonymously on a password protected computer system, and the data will be handled by myself alone. Your names will remain confidential, but your age and the length of time since you suffered your stroke, will be made public.

Can I see the results?

If you wish to read the dissertation you have participated in, which will be complete by April 2017, I will leave my e-mail address below. You are welcome to contact me regarding the study.

Once again, thank you for reading the above information and taking time to discuss the exercise. If you have any questions, please do not hesitate to pose them to the researcher.

Researcher: Sam Williamson – swilliamson4@uclan.ac.uk

11.10 Informed Consent Form

Informed Consent Form

Project Title: An investigation into the efficacy of semantic, phonemic and perceptual prompts to circumvent anomia, and the paraphasic speech of intracerebral haemorrhage victims.

Researcher: Sam Williamson

Thank you for agreeing to participate in this research project. In addition to this form, you shall be provided with an information sheet aimed at explaining the test to you thoroughly. However, if you have any questions, please do not hesitate to pose them to the researcher before progressing further. You may keep both forms in case you need to consult them at any point.

Declaration:

- I have read the information sheet provided and understand the premise of the project.
- I understand that my name and personal data (except my age) will be withheld from the public, and all data will be destroyed upon completion of the project.
- I understand that the exercise will be recorded and handled by the researcher alone.
- I understand I am able to withdraw from the project at any point, without need to provide a reason, and all data from such an instance would be disposed of accordingly.

Participant Signature:

Researcher Signature:

Date: