In This Issue

From the Coordinator: Updates by Julie L. Wambaugh ............................................... 131

Introduction by Jacqueline Stark ................................................................................. 132–134

Verbal Perseveration in Aphasia: Definitions and Clinical Phenomena From a Historical Perspective by Jacqueline Stark............................................................. 135–151

Treatment of Verbal Perseveration in Persons With Aphasia by Jacqueline Stark ........152–166

Similarities and Differences Between Perseverative and Non-Perseverative Errors in Aphasia: Theoretical and Clinical Implications by Nadine Martin......................... 167–175

Reducing Aphasic Perseverations: A Case Study by Maria L. Muñoz......................... 176–183
From the Coordinator: Updates

Julie L. Wambaugh

Welcome to our last issue of Perspectives on Neurophysiology and Neurogenic Speech and Language Disorders for 2011. We extend our sincere thanks to Jackie Stark, Issue Editor, and the contributing authors for this wonderful issue concerning perseveration.

I want to thank all of our affiliates for your support of Special Interest Group 2. It has been my honor to serve as Coordinator for the past 3 years. Carole Roth, current chair of the Education and Mentoring Committee and returning member of the Coordinating Committee (CC), will step into the role of Coordinator as of January 1, 2012. I would like to extend my appreciation to Jane Pimentel and Gail Ramsberger, who will also be leaving the CC. In addition to Carole, please welcome our other newly elected CC member, Gloriajean Wallace.
Introduction

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It is both a pleasure and an honor to edit this issue of Perspectives. The topic of perseveration is a very relevant one and deserves the attention being paid to it. In the way of an introduction, I would like to recapitulate how I became interested in the topic and thereby provide a personal, chronological introduction to the articles making up this issue.

In 1975, Karl Gloning and I were asked to assess a client—MH—at the Neurological Clinic of the University of Vienna. Even after 35 years, the case of MH remains the most interesting case study of verbal perseveration I have ever evaluated (see Stark, 2007). The collected language data from MH remained unanalyzed for several years. Then, in 1982, I was fortunate to be able to attend the Linguistic Society of America Summer School on Neurolinguistics held at the University of Maryland, College Park as a doctoral student. It was a once-in-a-lifetime experience. I attended lectures by renowned aphasiologists Elisabeth Bates, Hugh Buckingham, David Caplan, Alfonso Caramazza, Mary Louise Kean, Herman Kolk, John Marshall, George Ojemann, Alan Rubens, and Harry Whitaker. Alan Ruben’s course, titled “Neurological Studies of Acquired Language and Cognitive Disorders,” rekindled my interest in the topic of perseveration. I was fascinated by class discussion and video examples of perseveration by persons with aphasia (PWAs), apraxia, and agnosia. I changed the topic of my doctoral thesis to “Verbal Perseveration in Aphasia—A Neurolinguistic Approach” (in German). The data from MH constituted the case study in my doctoral thesis (July 1984).

In the process of researching the topic, I reviewed the old classical studies on perseveration, as well as more modern studies. The rigorous debates among the aphasiologists from the 1880s to the 1930s were fascinating, as were the three accounts of perseveration they put forward. My thesis included these accounts, as well as examples of perseverations taken from a research project. Because I found the ideas put forward by Lissauer (1890) and Heilbronner (1895, 1897, 1906) to be most adequate for explaining the perseverative responses I had observed over the years, I tested the hypothesis that the perseverative errors observed in the main aphasia types reflected the primary language processing deficits characteristic of that aphasia type. My two working hypotheses regarding the specificity of perseveration were

Hypothesis 1. Verbal perseveration is to be characterized as a non-specific indicator of brain damage and, for that reason, the same type(s) of perseveration will be found in all persons with aphasia, regardless of the type of aphasia.

Hypothesis 2. Verbal perseverative responses are to be characterized as Type-b effects, according to Yates (1966). That is, the responses reflect the specific language impairment and, therefore, are specific in their form.

To test these hypotheses, I described the perseverative responses produced in the various language tasks included in the test battery for that project, which encompassed all linguistic levels. The language battery was administered twice to 20 PWAs with Broca’s, Wernicke’s, anomic, conduction, and global aphasia pre- and post-provision of language
therapy. The language data elicited from MH were also taken into account for addressing the hypotheses. The language data from the PWAs provided support for Hypothesis 2: The analyzed perseverative errors made by the PWAs with different types of aphasia were a reflection of their respective overall language processing difficulties. Examples from these analyses are presented in the first article of this issue. The results also demonstrated the significance of the context in which a perseverative response was made. The exact time or place a perseveration occurred was not predictable; however, the form of the perseveration mirrored the primary deficit(s).

In the years following the completion of my thesis, several papers on the origins of perseveration and the specificity of perseverative responses in respect to the primary deficits were published. They presented findings that, in fact, had already been put forward and discussed in much earlier publications. The ideas I had put to paper in 1983 were not referenced, probably due to the fact that my analyses were in German. I am glad to edit this issue on perseveration and to present some of my original data in English.

This issue provides a mix of topics pertaining to perseveration, including theory and practice. After reading the articles, readers will be in a better position to evaluate and treat perseverative behavior and, thus, to return to their work or research settings with a better understanding of the perseverative responses produced by their clients with aphasia. The first article serves as an introduction to the topic of perseveration. In addition to definitions of the term, a historical perspective and examples are presented. As in all areas of research, the interpretation of the perseverative phenomena is based on the theoretical conceptions of the researcher. This will become particularly evident in the case of perseveration. The data and theorizing in recent publications support the assumption that perseveration is best characterized as reflecting the primary language processing difficulties present in each individual PWA.

The second article is a survey of the publications that address the treatment of perseveration. Departing from the only specific method focusing on Treatment of Aphasic Perseveration (TAP; Helm-Estabrooks, Emery, & Albert, 1987), I summarize general strategies and a procedure for treating perseveration. Other publications dealing with the treatment of PWAs, who show a tendency to perseverate, also are summarized. I emphasize that, although perseveration is such a considerable and arduous symptom in aphasia, few publications deal directly with the treatment aspects. The emphasis rather lies on treatment of the specific language deficit(s), for the very reason that, when the deficits are treated, a reduction in perseveration is expected to be observed.

In her contribution to this issue, Martin characterizes similarities and differences between perseverative and non-perseverative errors in aphasia from a theoretical and clinical perspective. She applies the account of perseveration put forward in Martin and Dell (2007), which postulates that word and sound perseverations result from the same mechanisms as non-perseverative errors—namely, a slowed activation of the intended utterance and linguistic similarity between the target and the produced error. The implications of this application are discussed with reference to treatment approaches that are designed to reduce perseverations.

Therapy studies focusing on reducing perseveration are few in number. A notable exception is Muñoz’s contribution to this issue. She presents a well-designed study of a Spanish-speaking PWA who presents with severe naming deficits. The treatment was conceptualized to manipulate the overactivation of the perseverative response and the underactivation of the correct target response by systematically reducing the interstimulus interval and providing therapy according to the semantic feature analysis protocol. An interesting result of her study is that, although she was able to reduce the perseverative responses in her client, which was maintained in the follow-up, his naming accuracy improved only minimally. However, his communicative effectiveness increased as judged by the PWA and his family.
Finally, this issue includes a selected bibliography of publications on perseveration and related topics (see supplemental material).

Last but not least, I would like to dedicate this volume to Hugh W. Buckingham in appreciation of all his creative work on perseveration over the years!

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References


Verbal Perseveration in Aphasia: Definitions and Clinical Phenomena From a Historical Perspective

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Abstract

Perseveration, and in particular verbal perseveration, has been defined in various ways depending on the perspective of the investigator. A widely accepted definition is that perseveration is the inappropriate recurrence or uncontrolled repetition of a previously produced response—phoneme, word, syntactic structure, semantic feature, idea, and the like—in place of the correct target item.

Verbal perseveration has a long history in aphasiology research. Reading the classical papers on the topic is essential to gaining a basic understanding of perseverative language behavior. A survey of the classical literature on perseveration reveals three explanations of the nature of the underlying deficit that results in perseveration. It will be shown that many current concepts were actually posited in the classical aphasiology publications as early as 1879.

A very nice illustration to this topic was provided by a paralytic patient of Abraham, whom I observed together with him. He had almost colossal perseveration. Instead of all the requested words to be written down, once he produced the word "tongue" (= "Zunge"), which he also produced in response to any other word to be repeated. When I wrote down a 3 in front of him with the request for him to copy it, he added to my 3 ‘unge’ making it Zunge (as he considered my 3 to be a Z, which of course in writing is similar to Z in German). One sees here clearly, that not the movement itself got stuck, but rather the inner word form. (Liepmann, 1905, pp. 120–121)

Given the complexity of the example from Liepmann (1905), it is comprehensible that the topic of perseveration has challenged aphasiology researchers for more than a hundred years. Over the past 3 decades, publications by renowned researchers have advanced our understanding of the complex perseverative phenomena, particularly in regard to aphasia, and have kindled the discussion, keeping it lively to date (see Buckingham & Buckingham, in press).

A widely accepted definition of (verbal) perseveration is that it is the inappropriate recurrence or uncontrolled repetition of a previously produced or heard response—phoneme, word, syntactic structure, semantic feature, idea, and the like—in place of the correct response. To gain a basic understanding of perseverative language behavior, the reader can start with a survey of the original, classical, and more recent papers on the topic. In this paper, perseveration will be characterized in terms of the various features and pertinent issues to provide an overall picture of the phenomena. In order to capture the points that are relevant for a comprehensive treatment of the topic, I have organized the text in the form of questions and
answers that span the nomenclature, history, types, and examples of perseveration and the assumed causes or origins.

**Definition**

What is perseveration? Based on definitions in the literature and my own clinical experience, my working definition of perseveration is:

*Perseveration is a phenomenon whereby the subject unintentionally produces or “gets stuck” on an information unit (i.e., a particular linguistic form or action unit), which he/she has previously produced or at some level has heard (i.e., auditorily processed), or seen (i.e., visually processed).*

Several points in this working definition require further explanation.

**Unintentionally**

A PWA does not intentionally produce a perseverative response, just to produce any response. It is not possible to foresee exactly when the PWA will make a specific perseverative error. This is also one reason why perseveration is such an interesting phenomenon. Heilbronner (1906) maintains that perseveration is fascinating to analyze, because it is not possible to set up an experimental design that enables the researcher to predict a perseveration will be produced for any specific item. It is not possible to predict exactly when a perseveration will occur (i.e., be produced).

**Information Unit**

This term covers all the possible linguistic forms that can be perseverated. From an articulatory feature, a phoneme, a morpheme, a syntactic structure, and a semantic feature up to an idea, all of these units can be perseverated. An action unit would refer more to perseverative responses (e.g., in carrying out commands in tasks/tests for assessing various types of apraxia).

**Previously Produced, Auditorily Processed**

Perseveration is usually perceived in terms of a response that a PWA has actually produced. However, a PWA can also perseverate what he/she has heard or auditorily processed (e.g., from an ongoing conversation in close vicinity, such as “unintentional eavesdropping”), or he/she can perseverate something he/she has seen or silently read (e.g., on a poster or sign in passing by). Von Sölder (1899) stressed that his patient not only produced wrong words, which he himself had not previously produced, but also ones that he had heard before. Thus, for a response to be considered a perseveration, it does not have to be a response that the PWA himself/herself has produced. However, it will be more difficult for the clinician to detect and classify such responses as being perseverative (see Gloning, 1974). Similarly, some perseverative responses may be classified wrongly as paraphasias, because the clinician was not present when the PWA produced the correct response or paraphasia the first or second time, and thus cannot recognize the production as recurring a second or third time.

Perseveration, and in particular verbal perseveration, has been defined in various ways depending on the perspective of the investigator. A selection of definitions includes

- Liepmann (1905): “Three separate facts are embraced by the term perseveration [three types of perseveration are meant, see below]. . . . If someone continually utters the same word, repeats the same movement incessantly, we have an occurrence of perseveration” (p. 115). . . . [It is produced] “without external inducement multiple repetition of the same innervation complex” (p. 116.).

- Jasper (1931): “Perseveration may be defined as the tendency of a set of neurons, once excited, autonomously showing resistance to any change in this state” (p. 28).
• Cameron and Gaunt (1933): “The tendency for an activity to persist after the subject has decided to change that activity, this persistence is the primary activity being shown by a transitory interference with the new activity which follows it” (p. 735).

• Goldstein (1948): “We consider perseveration as a means utilized by the organism to avoid catastrophe” (p. 18).

• MacNalty (1961): “Perseveration is the recurrence of an experience or activity without the appropriate exciting stimulus.”

• Eisenson (1984): “Perseveration may be defined as the abnormal persistence of a response when the stimulus that initially elicited it is no longer present and another response to a subsequent stimulus has been presented” (p. 95).

Liepmann’s (1905) definitions (i.e., three types of perseveration) are actually the most frequently used today, although they are named in a different way by Sandson and Albert (1984; see also Albert & Sandson, 1986; Sandson, 1986; and also Yamadori, 1981). Liepmann’s tonic, clonic, and intentional are termed continuous, stuck-in-set, and recurrent by Sandson and Albert, respectively. The term recurrent has caught on and is often used to refer to the type of perseveration most affiliated with PWAs.

The key words to be extracted from these definitions include tendency, abnormal, recurrence/repetition, and transitory interference—without the appropriate exciting stimulus. Perseveration represents a tendency for the PWA to produce a perseverative response, the likelihood of which depends to a great extent on the severity and type of impairment. According to studies reporting on the prevalence of perseveration in PWAs, the percentage varies from 24% (Basso, 2004) to 93% of the PWAs who exhibited at least one perseverative error (Helm-Estabrooks, Ramage, Bayles, & Cruz, 1998). However, the pattern of the perseverative behavior is more important, because, as previously stated, one cannot predict in the clinical setting when a perseverative error will be made. In the case of aphasia, it is an abnormal response, due to an impairment in language processing. The term recurrence or repetition is important for the clinician to consider when differentiating among types of perseverative performance (e.g., tonic—the inability to motorically relax after completing an action—or clonic—continuous repetitions, which are continuous forms; see Liepmann, 1905). In contrast, recurrent perseveration is the inappropriate repetition of a previously emitted response to a subsequent stimulus. A perseverative response can be separated by several correct responses—for example, in a naming task—and the utterance is a transitory interference in the language production process (see Pick, 1931). Because the perseverative response is produced in place of the correct response, there is no appropriate exciting stimulus. Determining what is an appropriate exciting stimulus is at times a difficult task. However, several variables, including the context in which a perseveration is produced, have been claimed to influence or induce the production of a perseveration.

**Type of Deficit or Symptom**

What type of symptom or deficit is perseveration? What is the nature of perseveration as observed in PWAs?

Subsequent to brain damage, two types of deficits are distinguished in the neuropsychological literature: generalized, diffuse, non-focal, non-localizing, and nonspecific deficits versus selective, focal, lateralizing/localizing, and specific deficits. Perseveration has often been characterized in this neuropsychological literature as one of the nonspecific, non-localizing, or general symptoms found in persons with brain damage, whereas agrammatism, paragrammatism, finger agnosia, and acalculia are considered specific or selective deficits. Other nonspecific deficits include slowness in responding, or in understanding and changing to task demands, stickiness, loss of the capacity for abstract thinking, reduction in scope of attention, stimulus boundedness, simplification, and omission of details.
However, this dichotomy has been contested in the neuropsychological literature (see Stark, 2011, article on treatment). This construct has been criticized because of the difficulty of teasing apart a specific aspect of behavior from a nonspecific indicator and because it fails to capture the selective and systematic nature of the errors as exhibited by different PWAs with differing patterns of performance. Yates (1966) proposed a more differentiated classification that consists of three types of deficits and captures perseveration more adequately. According to Yates (1966), the types of changes found in an individual subsequent to brain damage are

1. a general deterioration in all aspects of functioning; but will also produce
differential (group) effects, depending on the location, extent, etc. of the damage, and will produce
3. highly specific effects if it occurs in certain highly specified areas of the brain (p. 112).


In several publications (Allison, 1966a, b; Kleist, 1934), perseverance has been described as a sign of both focal (Type-b) and diffuse (Type-a) damage. The focal, specific circumscribed perseverative responses observed in PWAs reflect the Type-b changes, while a pervasive general deterioration observed (e.g., in later stages of dementia) reflect Type-a changes. This could be a reason why perseverance has been considered a nonspecific, generalized deficit. In a case study of verbal perseveration as the initial symptom in a person with Jacob-Creutzfeldt disease (JCD), Stark, Kristoferitsch, Graf, Gelpi, and Budka (2007) described an example of perseveration’s becoming worse until all language functions were affected. Even in such a case, the nature of the perseverative errors mirrored the underlying severe impairment, which progressed rapidly until language processing was no longer possible. The perseverations were produced before a diagnosis of JCD had been made and, due to the clinical picture, a rapid decline in the PWA’s performance was observed.

Kleist (1934) differentiates between two types of perseveration in his discussion of clients suffering from war injuries—missile wounds of the brain. The first type is a sticking to sensory, language, action, recognition, and thought engrams due to deficits of cortical function; perseveration is strongest in that domain where the focal symptoms are present. The second type is a general symptom due to a brainstem lesion. In this case, perseveration is comparable to other, so-called general symptoms, including unconsciousness and somnolence.

**Co-occurring Symptoms**

What symptoms co-occur with perseveration? What phenomena are related to perseveration?

In aphasia literature, authors have distinguished several deficits as repetitive language and/or speech behavior. These include recurring or recurrent utterance, stereotypy, automatic speech, verbal stereotypy, echolalia, logorrhoea, and palilalia. Some of these deficits/symptoms co-occur with perseveration. The underlying mechanisms for several of these deficits are not well understood. However, it can be assumed that the underlying causes for the various deficits will differ.

Perseveration can co-occur with paraphasias (verbal, phonological, and/or semantic), jargon, and echolalia. *Echolalia* is defined as “the involuntary repetition of all or part of the speech partner’s utterance” (Lebrun, 1993, p. 228). Several forms have been identified:

- **Immediate**: The PWA responds without delay by producing part or all of the utterance of his/her speech partner.
- **Delayed**: The PWA produces an utterance produced by his/her speech partner after (an) intervening utterance(s).
• Complete or unmitigated: The PWA produces verbatim repetition of the utterance (statement or question).

• Mitigated: The PWA responds with an adaptation (i.e., modification of the original utterance—for example, changing the personal pronoun and verb form).

With regard to the underlying impairment in echolalia, several hypotheses have been put forward, including the PWA's inability to understand a request. In an attempt to gain time to respond, the PWA repeats either part or all of what was asked or adapts the question by personalizing it, as in the following examples of mitigated echolalia:

Q: “Where do you live?”
A: “Where do I live?”
or
Q: “Do you have children?”
A: “Do I have children?”

Goldstein (1948) stressed this ploy by the PWA to gain time to better understand what has been said. The issue of how much is understood by the PWA with echolalic responses is still under discussion. Stengel (1964) and Stengel, Vienna, and Edin (1947) consider echolalia to result from an intention of the PWA to identify with his/her speech partner.

The most severe repetitive deficit observed in PWAs is recurring utterance. Jackson (1880) coined the term recurring utterances and defined it as utterances that “are always utterable, and they remain with the exception of rare occasional utterances” (p. 205). According to Jackson, three characteristic features apply to a person with recurring utterance:

1. “He has it;
2. He has no other utterance (except perhaps “yes” and “no”);
3. He cannot get rid of it” (Jackson, 1880, p. 335; 1915, p. 157).

This phenomenon has also been termed permanent barrel organism, in contrast to temporary barrel organism, which is another term for perseveration (see Jackson, 1880, p. 346; Jackson cites Gairdner’s expression). The analogy here is that a word, phrase, or other item gets stuck temporarily on a barrel organ. In the case of a recurring utterance, whenever the PWA attempts to utter something, only the recurring utterance is produced; therefore, it is considered a permanent barrel organism. Code (1982) characterized recurring utterance “as an utterance made up of either real words or of a non-meaningful string of speech sounds which some aphasic patients produce either every time they produce speech or just sometimes” (p. 141). A survey of the literature reveals that, in particular, the terms recurring utterance, (verbal) stereotypy, (verbal or) speech automatism, and word rest are often difficult to differentiate.

**Historical Lessons**

In what ways do the historical classical publications and debates on perseveration inform us on perseveration? What causes of perseveration were postulated in the classical papers?

The classical discussion of perseveration began with Jackson’s (1880) discussion of a phenomenon he and Gairdner termed barrel organism (i.e., a repetition of words or phrases, as if the PWA is playing the words on his barrel organ): “The word or phrase becomes a temporary recurring utterance; the permanent recurring utterance in loss of speech may be called permanent barrel-organism” (Gairdner cited in Jackson, 1880, p. 346).

In the German-speaking countries, Lissauer’s (1890) publication focused on visual agnosia-initiated discussion on the topic of perseveration among clinicians (see Stark, 2007a, for a lengthier discussion). One of the deficits observed in Lissauer’s patient was that he “got stuck” when he was asked to produce a new response (e.g., in naming a new object). Then, in
1892, Pick described a patient with what he termed *pseudo apraxia*, who also showed a tendency to get stuck on previous perceptive as well in the expressive functions. It was not a case of apraxia per se and, for this reason, Lissauer coined the term pseudo apraxia. In 1894 at a meeting of German neurologists, Neisser used the term *perseveration* to comment on a case presented by Heilbronner and to summarize the debate (Neisser, 1895). He pointed out that the symptom they were discussing is found in very different conditions. For this reason, he argued that it is necessary to have a term that can be applied to all the conditions, namely *perseveratory response* or *perseveration*.

In the following years, three accounts pertaining to the origin of perseveration were formulated by the classical German aphasialogists. These are what I have termed the *deficit, overactivation*, and *underactivation* accounts. The accounts differ in their treatment of perseveration as a primary versus secondary symptom and in the overall status of activation in a damaged system: too much activation versus too little activation or an overall reduced level of activation throughout the language processing system.

Figure 1 represents an attempt to characterize the content of the three accounts in the form of a sketch of perseveration. (See Stark, 2007a, for other schematic representations of the various accounts.)
Figure 1. Schematic representation of the classical conceptions of perseveration

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<th>Target item, i.e. expected response</th>
<th>Processing</th>
<th>Actual response</th>
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<td>□ +</td>
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<tr>
<td>2. Response × or Response △</td>
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<td>× □ P</td>
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<td>Heilbronner (1906); Lissauer (1890)</td>
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<th>Context</th>
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<td>2. Response ×</td>
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<td>3. Response ○</td>
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<td>4. Response □</td>
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<td>□ △ × ○ P</td>
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<td>Heilbronner – complex example</td>
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<td>2. Response ○</td>
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<td>von Söder (1895, 1899) – complex example</td>
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<td>3. Response × or</td>
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|von Söder (1895, 1899)             |            |                |

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<td>2. Response × or</td>
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<td>or</td>
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<td>□ × P</td>
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Legend:
- ● Deficit
- △ Overactivation
- □ Different responses
- △ Underactivation
- □ Correct responses
- □ Perseveration
Deficit Account

The deficit account is based on publications by Lissauer (1890) and Heilbronner (1895, 1897, 1906). Perseveration is considered a secondary symptom, and the primary symptom is a deficit (i.e., a specific breakdown in language processing in the case of a PWA). Depending on the nature of the deficit(s), the perseverations will reflect the primary disorder. A PWA perseverates when he/she cannot produce the correct response. The gap caused by the primary deficit (e.g., an inability to retrieve and produce the name of an object) allows perseveration to come into play and, thereby, fill a gap with either a word or phrase that was initially correctly produced or produced as a paraphasic error. By this account, the correct response is not suppressed or inhibited; rather, it is not available.

Typically, after a particular form is produced, the activation returns to a “normal” or approximate “resting” level. In the case of a PWA with a specific language processing deficit, the activation level remains higher and, thus, increases the likelihood the PWA will produce a previous target item when a gap or processing difficulty arises.

In the first and second sections of Figure 1, Heilbronner’s (1906) and Lissauer’s (1890) ideas are schematized for a case of simple perseveration and for a more complex hypothetical example, respectively. In the first case, the PWA may try to activate the target word, but is unable to retrieve and produce the correct name. The PWA may have some idea of the target item $x$, but ultimately he/she cannot activate the correct name and a perseverative response is produced (□) or a perseveration consisting of part of the target ($x$ □) is produced. Due to this word-finding breakdown, the previously produced name (□), which is still activated, is produced. On the other hand, the word-finding difficulty (= deficit ●) may become apparent right from the start of language processing for that item (e.g., of trying to retrieve the name of the depicted object, ∆). In this case, the name of the first object (□) is produced as a (recurrent) perseveration.

In the more complex example (depicted in section 2 of Figure 1), given that one cannot foresee when a PWA will actually produce a perseverative response, the PWA may correctly respond to the first 3 target items—□, ∆, ○—and then, for the 4th, perseverate parts or all of the first three responses and also of the actual expected one: □, ∆, ○, x. These complex examples are usually produced in the context of more extended language production (e.g., within sentences or a text). Such examples are particularly informative with regard to how the damaged language processing system deals with activated linguistic units in a response that consists of several words or sentences. (See examples in text.)

Overactivation Account

The overactivation account was put forward by von Sölder (1895, 1899). This account treats perseveration as a primary deficit. That is, due to a higher level of activation of the previously produced response, a new response does not have a chance of being produced. In addition to the greater intensity of the activation, the necessary inhibitory strength essential to make it possible to retrieve the next items is also reduced.

Perseveration is the result of a pathological persistence in activation of the previously produced unit. Von Sölder maintains that, “The patient is not forced to take a different ‘route’ due to the impassability of the correct route, rather he gets into the wrong route because this one is particularly accessible” (1899, p. 519).

In Figure 1, von Sölder’s account is depicted in sections 3 and 4. In the case of a simple perseverative response, the first response (e.g., in a naming task) is correctly produced (□). However, the activation level remains so high that, when a new response is called for (e.g., to a different picture), the PWA does not have a chance of retrieving the new expected response. This account does not address the possibility of whether or not the PWA has some idea of the name. The overactivated first response is thus produced (□).

In the more complex example (section 4 of Figure 1), the third response consists of perseverated parts of the first two responses: one originally correct and the second a
perseverative response ($x\square$, or $x\square\circ$). Once again, the complex examples apply to responses produced in tasks requiring more than a one-word response.

**Underactivation Account**

This account builds upon Pick’s ideas (1900, 1902a, 1902b, 1903, 1906, 1914, 1931) in which he attributed perseveration to a weakening in the activation level or intensity of activation, whereby the required response (i.e., the target item) does not receive enough activation to be produced. Pick alludes to a “passive weight(iness)” of the already produced item, which does not—as in von Sölder’s account—push the target out of the way because of its force. Rather, it is the case that the new or next target item is too weakly activated and, for this reason, has less chance of being retrieved and produced.

In Figure 1, Pick’s underactivation or weak activation account is depicted in section 5. In the context of an underactivated system, the passive preponderance or weightiness of the last response ($□$) results in its production in place of the second expected response ($x$) or in a blend of the first and second response ($□x$).

The first and the third accounts are related in that the researchers considered perseveration to be secondary to a primary language processing deficit in the case of aphasia.

The principle issue in all three cases is how the system responds in the context of brain damage. All typical language processing requires a continuous balancing and combined deployment of activation and inhibition (see Dempster, 1991; Jung, 1953; Jung & Baumgartner, 1955). Therefore, the two parameters discussed in the interactive spreading activation models find their application in all three accounts (see also Cohen & Dehaene, 1998). Martin (2011) and Martin and Dell (2007) discuss two key parameters—namely, *strength of activation* and *decay rate*, which are comparable to inhibition.

- In the most extreme case, there is very little or no activation and a recurring utterance is the only response possible.
- There is weak activation (i.e., not enough activation to result in the selection and production of a language unit).
- There is overactivation to compensate for the damage, and this overactivation is overpowering and suppresses a new cycle of activation for another object to be named to begin.
- The decay rate following activation diminishes too quickly, and the selected form is not produced.
- The decay rate following activation lingers and diminishes too slowly, thus preventing a new cycle of activation necessary for retrieving the next item/production to arise.
- A combination of the above occurs.

In addition to the two parameters and the ways they can be affected, a crucial aspect is the point in the processing system where one or a combination of parameters goes awry, resulting in a specific pattern of errors and, in this case, perseverative errors. Knowing (i.e., determining where in the system language processing is disrupted or breaks down) is essential to understanding every PWA’s language deficits. In this regard, the questions posed by various authors in the classical literature on perseveration furthered the discussion. Heilbronnner’s (1906) suggestions are just as relevant today as they were in 1906:

In the first place, it would be important to investigate what causes the primary deficit in the various afflictions in the broadest sense—here only with regard to aphasia. Secondly, it would be necessary to specify more precisely what general principles must be satisfied, so that the error response, that indeed can be interpreted as a direct and understandable consequence of the deficit, is produced exactly in the form of perseveration. (p. 345)
A succinct response to the question of what one can learn from the classical accounts of perseveration is that many of the claims put forward today are closely related to what the classical researchers postulated in the period from 1879 (Jackson) to 1934 (Kleist; or up until 1948, if the publications by Goldstein written in English are also included). One must judge the degree of sophistication they achieved in carrying out their research and experiments—or that was exhibited in their test procedures—in the context of the overall state of the art in diagnostic procedures applied in aphasia research at that time.

**More Recent Research**

How have more recent researchers accounted for perseveration? Over the past 60 years, researchers have selectively referred to the classical accounts and addressed various aspects of the topic of perseveration. In Table 1, selected more recent accounts are listed. They differ in terms of their characterization of the mechanisms underlying perseverative responses and with regard to the perseverative behavior they were addressing.

**Table 1. Selected accounts of perseveration documenting the different characterizations of the source of perseveration**

<table>
<thead>
<tr>
<th>Authors (Pub. year)</th>
<th>Accounts of perseveration</th>
<th>Proposed to explain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goldstein (1948)</td>
<td>Catastrophic reaction</td>
<td>All forms of perseverative behavior</td>
</tr>
<tr>
<td>Kinsbourne &amp; Warrington (1963)</td>
<td>Post-activation of visual memory traces</td>
<td>Palinopsia; visual perseverations</td>
</tr>
<tr>
<td>Milner (1964)</td>
<td>Increased sensitivity to interference</td>
<td>Perseveration in frontal lobe patients</td>
</tr>
<tr>
<td>Luria (1965)</td>
<td>Pathological inertia of stimulus</td>
<td>Continuous perseverations</td>
</tr>
<tr>
<td>Luria (1965)</td>
<td>Inertia of program of action</td>
<td>Inability to switch activities</td>
</tr>
<tr>
<td>Hudson (1968)</td>
<td>Impairment of an inhibitory system</td>
<td>Intentional perseveration; verbal perseveration</td>
</tr>
<tr>
<td>Leicester, Sidman, Stoddart, &amp; Mohr (1971)</td>
<td>Abnormal conditioning (Reinforced responses)</td>
<td>Some verbal perseverations</td>
</tr>
<tr>
<td>Wepman (1972)</td>
<td>Application of selective inhibition</td>
<td>Verbal perseveration in PWAs</td>
</tr>
<tr>
<td>Gloning (1974)</td>
<td>Defective extinction mechanisms</td>
<td>Verbal perseveration in aphasia</td>
</tr>
<tr>
<td>Scarborough, Cortese, &amp; Scarborough (1977)</td>
<td>Abnormal priming mechanism</td>
<td>Verbal recurrences</td>
</tr>
<tr>
<td>Buckingham, Whitaker, &amp; Whitaker (1979)</td>
<td>Sensory-motor ideation disorder inducing recall processing</td>
<td>Intentional perseveration in posterior aphasics</td>
</tr>
<tr>
<td>Yamadori (1981)</td>
<td>Abnormal facilitation of memory traces</td>
<td>Verbal perseveration</td>
</tr>
<tr>
<td>Shindler, Caplan, &amp; Hier (1984)</td>
<td>Impaired retrieval</td>
<td>Verbal perseveration in aphasia</td>
</tr>
<tr>
<td>Cohen &amp; Dehaene (1998)</td>
<td>Processing level deafferented from its normal input source</td>
<td>Perseveration in PWAs (recurrent perseveration)</td>
</tr>
<tr>
<td>Buckingham &amp; Buckingham (in press)</td>
<td>Deafferented functional systems in the context of normal post-activation decay rates</td>
<td>Recurrent perseveration in aphasia</td>
</tr>
</tbody>
</table>
Range of Influence

What is the range of influence of perseverative error(s) in terms of language units or intermittent amount of speech produced? What is the range of influence expressed in time span (i.e., minutes, hours, days)?

Each PWA perseverates on different items and to a variable extent; analyses of numerous cases reveals that the shortest range is within the single unit (i.e., syllable) or from one item to the next one (i.e., from one word to the next word). In terms of linguistic units, the longest duration that I have observed was from one text to the following texts (e.g., ideational perseveration and perseveration of semantic features) within a session or across sessions.

Depending on the linguistic unit, perseverations can range from intra-item or intra-stimulus and inter-stimulus. For example, on the word level, a phoneme (or grapheme) can be perseverated within a single syllable, whereby articulatory features are perseverated. A phoneme can also be perseverated to the following syllable(s) or from the onset to the final position of the word (e.g., \textit{Luftballon}→\textit{Luftbaton} [\textit{balloon}] or \textit{foot}→\textit{foon}). The following is an example of an inter-stimulus, whole-word error in a naming task in the case of perseveration from one stimulus to an immediately following item or to an intermittently produced response: Item 1) \textit{book} (+); Item 2) \textit{table} (+); Item 3) \textit{pencil}→\textit{book}. An inter-stimulus error exhibiting only perseveration of the final phoneme is: Item 1) \textit{book} (+); Item 2) \textit{spoon}→\textit{spook}.

The context in which a perseverative response is produced or within which a linguistic unit is perseverated plays a role in its production. Even within the context of a single word, perseveration can occur intra-syllabically. The context can extend from within a single syllable of a word or within a word to within or between much longer linguistic units such as texts (e.g., from one picture description to the next one). The shape (i.e., linguistic level) and content that constitutes the context are relevant, as are the structure and content of the task. For example, a task consisting of phonologically or semantically related test items can give rise to or be conducive to a PWA’s producing a perseverative response, when he/she reveals a specific phonological or semantic/lexical deficit, respectively. It is not surprising that the same factors that play a role for healthy speakers also apply to PWAs. The impact of a specific variable on the production of a perseverative response will also depend on the degree of severity of the language deficit(s). (See Martin, 2011.)

Cohen and Dehaene (1998) present statistical methods for calculating the temporal course of perseverative responses and demonstrate how their methods can be applied to analyzing perseverative errors at different levels of processing. The two procedures are lag distribution analysis and perseveration probability analysis (see Cohen & Dehaene, 1998).

Perseveration in Main Aphasia Types

With regard to the overall differences in the production of perseverative responses by PWAs with the main aphasia types—Broca’s, global, anomic, and Wernicke’s aphasia (i.e., the fluent versus the nonfluent, or the anterior versus the posterior aphasia; see Helm-Estabrooks et al. [1998])—analyses of the perseverative responses produced by the 20 PWAs in Stark’s (1984) study showed the following:

- The perseverative responses from PWAs with Broca’s aphasia were less complex and of shorter duration than those of PWAs with Wernicke’s aphasia.
- Due to accompanying apraxia of speech, several PWAs with Broca’s aphasia perseverated on the production of phoneme and consonant clusters.
- Phonological, lexical, and morphological perseverations were observed in PWAs with Broca’s and PWAs with Wernicke’s aphasia.
- PWAs with Wernicke’s aphasia made more phonological perseverations than did PWAs with anomic aphasia.
- PWAs with Broca’s aphasia perceived their errors and attempted to correct them, while PWAs with global aphasia were either unaware of their perseverations or, due
to their sparse speech output, produced multiple perseverative responses of the limited forms they were able to produce.

Types of Perseverative Responses

Which types of perseverative responses have been postulated and, in particular, are observed on the various linguistic levels? Which linguistic units are subject to perseveration?

Perseverative responses have been observed on all linguistic levels—phonological, morphological, lexical, semantic, syntactic, and text level.

- On the phonological level, distinctive features and phonemes are perseverated.
- On the morphological level, morphemes are perseverated. Both derivational and inflectional morphology are affected by perseveration.
- With regard to lexical items, parts of words and whole words can be perseverated and not display a semantic relation.
- Semantic perseverations include the perseveration of semantic features, semantically related words, and more complex associations.
- Syntactic perseverations encompass syntactic form and content. Either a syntactic construction as such (e.g., WH-question, imperative construction) or the meaning of a syntactic phrase can be perseverated.
- With regard to the text level, ideational perseverations are observed within a text and from one text to another (see below).

Examples of perseverative responses for all linguistic levels are given in Table 2 (see supplemental material): Thirty five examples of perseverative responses from PWAs performing different tasks. The examples in Table 2 serve to illustrate the range of perseverative errors possible on the various linguistic levels. (The examples are from German-speaking PWAs and are translated into English.) More important than the type of error is the systematicity of the errors. Under the assumption that the perseverative responses mirror the underlying language processing deficits, a qualitative analysis of errors is meaningful in a single-case study.

On the various linguistic levels, a perseverative response can be clear cut (i.e., simple). In this case, single phonemes, parts of words, whole words, and semantic features can be perseverated (see examples 1–15, 17, 18, 20, 21, 23–28). In more complex examples, several types of perseverative responses can be entangled and co-occur with paraphasias (see examples 16, 19, 22, 29–35). The phonological, morphological, lexical, and semantic types of perseverative response do not require elucidation. However, the most complex type, the ideational or thought perseveration, requires clarification. An ideational perseveration refers to a perseverative response in which an idea or parts of an idea are perseverated to new items (e.g., from a conversation to a following picture description or from one picture description to another). One can speak of an ideational or thought perseveration if, due to a syntactic perseveration of form or content or a semantic perseveration (e.g., semantic features), the meaning or idea(s) of the following utterance(s) is/are uncertain or not discoverable or the meaning of the utterances is in contradiction to real-world knowledge (e.g., in picture descriptions) or the assertions made in previous utterances. An ideational perseveration shows a longer duration and is produced within lengthier speech passages (i.e., picture descriptions, retellings of stories, or a combination of tasks).

An idea can persist and the PWA then produces uncalled-for, additional responses to items (e.g., in a naming task) that require only single-word responses. In example 35 in Table 2, after the clinician asked the client what time is shown on the watch in the picture, the PWA perseverated the concept of time and what time it is over several items. For the next item, she produced a (semantic) paraphasia: (open) door → table. In an attempt to elicit the correct response, the clinician asked, “What about it?” The clinician was referring to the fact that the door is open. The PWA added, “With the table it is 12:30.” Then, following two other items, after naming an airplane correctly, she continued her response with, “but I do not know what time it
is on it.” Her monitoring was impaired; she did not recognize her errors and, therefore, made no attempt to correct them.

One of the most interesting examples of perseveration over an extended time was produced by the client cited above (example 35). The following example (Table 3) from MH’s language data demonstrates the complexity of perseverative behavior (see Stark, 2007b, for a case study of the perseverative responses produced by MH, a case of transcortical sensory aphasia). The example is from the administration of the Story Completion Test (Goodglass, Gleason, Bernholtz, & Hyde, 1972), which is designed to elicit specific syntactic constructions. This task consists of short stories that the PWA completes by supplying an adequate ending. For the test item (8a), the expected target response is, “He (Peter) will work again.” MH produced the question: “Wo hast Du Peters Spielzeug hingestellt?” This perseverative response consists of words from 3 items of the story completion task with a correct response among the perseverations. The resulting complex perseverative response is syntactically correct, albeit semantically inadequate.

Table 3. MH language data example from the administration of the Story Completion Test

<table>
<thead>
<tr>
<th>Story Completion Test (SCT) Item</th>
<th>MH’s Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>6a) Did you call me? [correct response]</td>
<td></td>
</tr>
<tr>
<td>6b) Did you really brush your teeth? [correct response]</td>
<td></td>
</tr>
<tr>
<td><strong>7a) Expected target response:</strong> Where did you put my shoes?</td>
<td></td>
</tr>
<tr>
<td>7a) Did you put your shoes anywhere?</td>
<td></td>
</tr>
<tr>
<td>7b) How did you repair the toy? [correct response]</td>
<td></td>
</tr>
<tr>
<td><strong>8a) Expected target response:</strong> He (Peter) will work again</td>
<td></td>
</tr>
<tr>
<td>8a) He asks: Where did you put Peter’s toy?</td>
<td></td>
</tr>
<tr>
<td>(Item 8a repeated) It will be the case that he asks Peter: Where did you put Peter’s toy?</td>
<td></td>
</tr>
</tbody>
</table>

| (8a) Ger.: Wo hast Du Peters Spielzeug hingestellt? |
| Eng.: Where have you Peter’s toy put? |
| **SCT item:** 7a 8a 7b 7a |

This is an example of a complex perseveration referred to in the classical explanations schematized in Figure 1. It shows the specificity of MH’s language processing difficulties. She could not monitor for semantic inadequacies, but self-corrected the few phonological errors immediately. The fact that her response—“Where have you put Peter’s toy?”—is syntactically correct provides evidence of selective impairment of specific language functions that leaves other functions intact.

Another illustrative example from MH’s corpus demonstrates an extended perseveration of the imperative construction (taken from Stark, 2007b). The responses were also made to items from the Story Completion Test (SCT; Goodglass et al., 1972):

- MH: The mother says: Be careful / that nothing / ver // : falls over on you: (Line 41 of MH’s transcript)
  **SCT Target:** Children be careful that nothing happens to you!
- MH: Be careful so that nothing happens to you! (Line 72)
  **SCT Target:** Sit (yourself) down!
- MH: Be careful so that nothing happens to you! (Lines 77–78)
  **SCT Target:** Come in!
• MH: Follow me so that nothing happens to you! (Line 80)
  **SCT Target:** Come in!

• MH: Drink it so that // so that / you stay healthy! (Line 83)
  **SCT Target:** Drink the/your milk!

• MH: Cut the lawnmower so that nothing happens to you! (Line 86)
  **SCT Target:** Cut the lawn /the grass!

• MH: Do not play with the toy or else something will happen to you! (Line 91)
  **SCT Target:** It (Ger.: neuter gender for 'baby') will cry.

This first utterance of this extended example (Line 41) was produced as part of a picture description—“Blind man’s bluff”—and was not semantically adequate, because the dishes had already fallen off the table. The second occurrence is a perseveration from Line 41. The target construction for the next five SCT examples is an imperative construction. However, the expected target form is different in each case. The additional phrase, “so that nothing happens to you,” is perseverated from its first occurrence in a picture description and is carried on to each response and adapted in each story. In Line 83, the response is even semantically adequate. In Line 91, a simple declarative sentence construction is the target; however, MH produced an adapted imperative construction. The negation “nothing” is now moved to the imperative clause, and the second clause takes on a new semantically anomalous meaning for that item. In the context of an impaired language processing system, these two complex examples reveal what can be accomplished when syntax is detached from semantics.

**Summary**

The main purpose of this paper was to elucidate the topic of perseveration from various perspectives. Not every aspect was covered in detail (e.g., localization issues). Other contributions in this volume address specific issues in greater detail. The reader is referred to these contributions for additional discussions on various aspects of perseveration. The topic of perseveration is a complex, albeit very interesting and important, one with regard to assessing the abilities of PWAs and providing language therapy to them. An understanding of perseverative behavior, also from a historical perspective, is relevant for providing optimal treatment to every individual who shows a great tendency to perseverate. The more research that is carried out with PWAs who perseverate, the better our theoretical and therapeutic approaches will become at ameliorating difficulties and, thus, improving clients’ quality of life.

**Acknowlegdment**

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**References**


Treatment of Verbal Perseveration in Persons With Aphasia

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Abstract

Providing language therapy to a person with aphasia (PWA) who exhibits a moderate to severe tendency to perseverate is one of the most difficult challenges with which a language therapist can be confronted. In the case of severe verbal perseveration, systematic language therapy may not even be possible. Thus, in such cases, to reduce or eliminate perseveration, the clinician needs to understand the mechanisms underlying verbal perseveration in the overall context of the individual’s language impairment.

Under the premise that verbal perseveration reflects the primary language impairment, for example, and affects the retrieval of phonemes or word retrieval, the clinician will need to choose different therapy strategies for each PWA. Following a summary of general suggestions put forward in the aphasia literature for reducing perseveration, I will discuss available protocols for treating perseveration (e.g., Treatment of Aphasic Perseveration or TAP; Helm-Estabrooks, Emery, & Albert, 1987) and survey the publications on treatment of verbal perseveration.

Client MV’s sister: . . . “I think I have to take my sister to the heart specialist. In the past weeks she has behaved a little differently and I am worried that she is having problems breathing. When I am having a conversation with her and she has problems speaking [i.e., the client gets stuck on a word she has previously produced or perseverates], all of a sudden she just stops talking and she takes a deep breath! Then slowly she starts talking again.”

Therapist: “No, Dr. . . ., you don’t have to go to the heart specialist with your sister. She doesn’t have any problems breathing. Your sister is just following my advice. I told her, that when she notices that she is having a problem finding the name of something or she says a word she has just produced, that she should stop talking and take a long deep breath. She should take a break and then slowly start all over again. Apparently she is really following my suggestion! I am really glad to hear that.”

Client MV’s sister: “Oh, I am so relieved to hear that. I was worried about her! Come to think of it, after she takes a deep breath, she usually says the right word or something close to it!”

(Excerpts from a telephone conversation between a person with aphasia’s [PWA’s] therapist and the client’s sister, translated from German.)

Albeit anecdotal, the excerpt above stems from an actual conversation with the sister of a PWA of the Wernicke’s type, MV, who showed a severe degree of perseveration in retrieving nouns and verbs in oral confrontation naming, oral sentence production tasks, and spontaneous speech (conversation). This conversation illustrates a PWA following the general advice of her therapist in an attempt to “break through” her tendency to persevere in
everyday life situations. The therapist’s advice, coupled with specific intensive language therapy to improve word retrieval for nouns and verbs, was successful. Her word finding improved, and her perseverative responses declined.

Although perseveration can be devastating for the PWA and represents a serious and resistant problem for the clinician assessing language skills in a therapy setting, few publications to date deal specifically with treatment of (verbal) perseveration. This may be due to the complexity of perseverative behavior observed in PWAs and/or to the fact that therapists do not know how to treat a client who has a very severe tendency to perseverate. While carrying out the research for this paper, and previously for other publications on perseveration, I was astonished how seldom I found the term perseveration in the subject indexes of books on assessment and treatment of aphasia. For example, perseveration is not listed in the subject indexes of both volumes of an important work on aphasia—The Aphasia Therapy File, Volume 1 (edited by Byng, Swinburn, & Pound, 1999) and Volume 2 (edited by Byng, Duchan, & Pound, 2007). These two volumes are not exceptions. In her selected lectures and papers, Sies (1974) does not include perseveration in the index. The fifth edition of Chapey’s (2008) book on language intervention includes two paragraphs on the topic (see Marshall, 2008; Morganstein & Certner-Smith, 2008).

In the aphasia therapy literature of the past decades, the only method specifically directed at the treatment of perseveration is Helm-Estabrooks, Emery, and Albert’s (1987) Treatment of Aphasic Perseveration (TAP; cf. also Helm-Estabrooks & Albert, 2004). A few other publications (e.g., Basso, 2004; Morganstein & Certner-Smith, 2008; Moses, Nickels, & Sheard, 2004; Stark, 2008) include brief discussions on attending to perseveration in the therapeutic setting and/or a warning, based on the client’s symptomology, to avoid a particular therapy method with certain PWAs. In this article, I will summarize content in available publications on treatment of perseveration. Based on the hypotheses discussed elsewhere in this issue of Perspectives (Stark, 2011; see also Stark, 1984, 2007), suggestions will be made on general issues as well as more specific approaches derived from the assumed underlying cause(s) for perseveration.

**Treatment of Aphasic Perseveration**

First published in 1987, Helm-Estabrooks et al.’s Treatment of Aphasic Perseveration (TAP) is the only actual therapy program that focuses specifically on the treatment of perseveration. In their original paper, the authors discussed methods as well as results from three successful applications with PWAs with a moderate to severe degree of perseveration.

In the most recent discussion of TAP, Helm-Estabrooks and Albert (2004) state the functional goal of their program: “to reduce recurrent verbal perseverations that block retrieval and production of correct target substantive words” (p. 201). Moreover, “the intent of TAP is to bring perseverative behavior to patients’ level of awareness and help them suppress perseverative responses and produce non-perseverative, correct naming responses” (2004, p. 203).

The authors described the best candidates for the TAP program as PWAs who are fully alert and have moderately preserved auditory comprehension and memory skills. They should be able to name some objects, but their most striking feature is moderate to severe perseveration. If a PWA shows a moderate or severe degree of perseveration on the pretest, the authors considered him/her to be an appropriate candidate for TAP. The Perseveration Severity Rating is calculated by dividing the number of perseverative responses on two subtests of the Boston Diagnostic Aphasia Examination (BDAE)—namely, the visual confrontation naming and word discrimination tasks—by the number of total responses. The authors suggested that TAP is applicable for PWAs presenting with perseveration “if the rating falls within the moderate (20% to 40%) to severe (49%+) range” (Helm-Estabrooks et al., 1987, p. 1254). The therapy design consists of TAP and other standard language therapy programs that are being provided
alternately (ABAB design), whereby each phase of the protocol consists of five sessions: TAP –
standard treatment – TAP – standard treatment – TAP. After each phase, the investigator
measured treatment effects by changes in the raw scores achieved on the tasks and the
percentage of perseverative responses.

Before starting the TAP program, the therapist sets up a hierarchy of the semantic
categories based on the individual's test performance. The therapy requires the client to name
pictured and real objects. The therapist may provide up to three cues (see list of specific
strategies for TAP, below). After the PWA produces the correct name, the therapist moves on to
the next item and asks, “So what is this?” The client has to name the object.

The clinician chooses options from a hierarchical list of 10 specific strategies for
providing cues in the therapy sessions. The selection is based on the individual PWA’s test
performance. (See the list of specific strategies for TAP, below.)

The authors provided a list of 38 stimuli to be used with all patients. The TAP stimuli
fall into these categories: objects, actions, colors, letters, numbers, body parts, and geometric
forms.

Two approaches are available to the clinician performing the therapy. The stimuli used
for naming are presented either category-by-category (actions, body parts, geometric forms,
letters, colors, objects, and numbers) or item-by-item (an item from one category followed by an
item from a different category).

Helm-Estabrooks and Albert (2004) provided a system for scoring both the naming
performance and the perseverative responses. For the confrontation naming responses, the
range is from 4 (the client responds correctly without receiving a cue) to 0 (the client responds
incorrectly after receiving three cues). Perseverative responses range from 0 to 4; 0 signifies no
perseveration and 4 signifies a perseverative response after the third cue.

One of the general strategies is to explain to the PWA why he or she is a subject in the
therapy program. The clinician explains what perseveration means and shows the client the
written word perseveration on a piece of paper. The clinician instructs the PWA to give no
response or to ask the therapist for help (but not to perform perseveration). The therapist
establishes a new set before stimuli from that set are presented for naming.

The therapist monitors the pace for presenting the stimuli and enforces a 5-second
interval between the presentations of items. In the case of a repeated perseverative response,
Helm-Estabrooks et al. (1987) suggested the therapist use a sensitizing technique: “If patient
consistently perseverates on a particular word, try sensitizing technique: write incorrect
perseverative response on paper, show it to patient, tear it and leave it in his field of vision as
reminder; every time he begins to say the word again, point to ‘word pieces’ quickly to help him
inhibit this response” (p. 1254).

Before administering the TAP-therapy protocol, the therapist should determine a
hierarchy of specific strategies to be used for the PWA. This hierarchy is based on the patient’s
overall performance on the BDAE. In the most recent description of TAP (Helm-Estabrooks &
Albert, 2004), 10 specific strategies—ranked from minimal to maximal assistance—are

- Time interval: The therapist “makes” the PWA wait 5 or 10 seconds before
  responding.
- Gestural cue: The therapist provides the pantomime that is associated with the
  object.
- Drawing: The therapist draws a picture of the object and the PWA says the name as
  soon as he/she recognizes the object, or the therapist asks the PWA to draw the
  object.
- Descriptive sentences: The therapist describes the object or its function.
- Sentence completion: The therapist provides a sentence for the PWA to complete.
• Graphic cue: The therapist writes the first few letters of the target word and asks the PWA to (a) complete writing the word and then (b) read it aloud.

• Phonemic cue: The therapist provides the initial phoneme of the target word.

• Oral reading: The therapist writes the entire target word and asks the PWA to read it aloud.

• Repetition: The PWA repeats the word.

• Unison speech or singing: Together, the PWA and therapist say/sing the word.

The three cues selected for use with a PWA apply for a single session; they may be changed from session to session to achieve optimal results.

Helm-Estabrooks et al. (1987) administered TAP to 3 PWAs diagnosed with transcortical sensory aphasia, nonfluent aphasia, and conduction aphasia, respectively. Results indicated significant reductions in perseveration (33–85%) for PWAs using TAP compared to results for PWAs using traditional therapy.

**Discussion of TAP**

Although the authors emphasized that they treat perseveration and do not focus on linguistic errors, they actually achieved their results by means of the content and structure of the therapy program for each individual PWA: Oral confrontation naming is systematically trained for a pool of 38 items. The therapy protocol is individualized, because the therapist selects specific strategies tailored to each PWA. The therapist chooses cues he/she believes will most effectively help the PWA retrieve a target word; thus, the client is working on improving specific word retrieval and production skills. For this reason, the results for the 3 PWAs in the original study (Helm-Estabrooks et al., 1987) provided evidence for the hypothesis that an improvement in performance in impaired language abilities leads to a decline in perseverative responses. The selection of strategies and cues was based on the performance of each PWA. The graphs for all 3 clients show an increase in number of words named correctly in combination with a decline in the number of perseverations. The fact that the TAP phase was more effective in reducing perseverative responses can be taken as evidence that the therapy provided during that phase addressed the PWAs’ naming deficits better than did the methods used in the alternate phases. In particular, Case 1 “lost ground with the standard treatment approach (i.e., his naming raw scores decreased, while his perseveration rating increased)” (Helm-Estabrooks et al., 1987, p. 1254).

Considering how persistent perseveration can be, I find it notable that the therapy provided to the 3 PWAs in the original study resulted in such a decrease in the percentage of perseverative responses in a relatively short time (i.e., two phases of five sessions each). Five sessions of TAP to address such a formidable problem may not suffice in all cases where PWAs exhibit a moderate to severe degree of perseveration. This further substantiates the fact that focusing on the language deficit in a specific way led to the observed improvement. The general strategies and time interval strategy allowed the PWA to benefit more from the specific training and types of cues employed in the confrontation naming task. (See Muñoz, 2011: The duration of the therapy provided may be a reason for the observed results in her study.)

The general strategies are part of the therapy protocol. They address important, basic issues that every language therapist should be aware of, and adhere to, when treating any type of language deficit or when evaluating PWAs. To obtain the best possible response or overall language performance from a PWA, the clinician should regularly establish a new set and even make the PWA aware of a new stimulus item within a set. This approach helps the clinician obtain and maintain the client’s attention. Related to this point, although listed as one of specific strategies, the time interval strategy is also basic and relevant for interactions with a PWA, in particular a PWA with a moderate to severe degree of impairment. This is especially
true when the client has fluent aphasia and presents with press of speech, logorrhoea, or jargon.

The only general strategy whose effectiveness is debatable is the clinician’s writing the error on a piece of paper or even saying the error to the client. Even if the slip of paper is ripped up in front of the client, the process of recording an incorrect response and placing the paper on the table in view for the client draws attention to the error and may reinforce or strengthen the error. In any therapy protocol I have administered, I have avoided reproducing an error. For example, I would never tell the client, “You don’t say X (= incorrect response), but rather Y (= correct response).” The closest example of the therapist’s using an incorrect form to elicit a correct response is when the therapist instructs the client to monitor two responses to hear the difference. In this case, both forms are presented. “Listen carefully to the following words: X - Y. Do you hear the difference between X (correct form) and Y (incorrect form)?” The two stimuli could differ along various dimensions (e.g., phonemic or semantic).

The position “that perseveration can be raised to a conscious level and actively inhibited by the patient, allowing for a correct, non-perseverative response” (Helm-Estabrooks et al., 1987, p. 1255) applies to PWAs who have less severe impairment and are able to monitor their own productions to a certain degree. Although they are not optimal candidates for the TAP program, PWAs with severe impairment—either due to poor comprehension abilities and/or very restricted oral confrontation naming skills—are more likely to have a severe degree of perseveration. However, the greatest therapy challenges are presented by PWAs who produce only recurring utterances in combination with severely impaired comprehension. In particular, individuals with severe global and Wernicke’s aphasia will seldom be in the position to actively inhibit a perseverative response. In the recovery process, when the client achieves a certain level of improvement in language skills, he/she may become aware of the perseverative response. The conduite d’approche behavior, or successive approximations, is an indication that a PWA has some concept of a phonological representation, albeit perhaps an underrepresented one. However, the full representation to be produced is not available. Repairs resulting in the production of the correct target item are evidence of the PWA’s speech monitoring and ability to stop producing. In the case of conduite d’approche behavior in persons with Wernicke’s and conduction aphasia, the chain of produced responses often approaches the target item or even reaches the target item and then moves away from it, without the PWA’s becoming aware that the correct response was indeed among the productions. The appearance of prepairs in these patients’ production also demonstrates that their awareness of an error is to be distinguished from their ability to actively inhibit the production of a perseverative response or a paraphasic error. The prepairs are also an indication for pre-speech monitoring.

Because of the effects of an individual PWA’s underlying language deficits, the PWA’s awareness of a perseverative response and ability to inhibit it should be regarded as only part of a complex problem. The main issue is what is assumed to be the cause or origin of the perseverative response(s). If one accepts the hypothesis that perseverative responses are produced because of, or as a reflection of, the underlying deficits (e.g., in word retrieval and production or naming disorder), then one expects that, by treating the specific impairment, the perseverative responses will decline or fade away. Perseverative responses reflect the underlying deficit(s). This point is further discussed in the following sections.

**Other Publications on Treatment of Perseveration**

Moses et al. (2004) examined recurrent perseveration in PWAs and suggested possible directions for intervention. They maintained that, “Rather than treating perseverative errors as an isolated problem, perhaps the focus should shift to treating the underlying language impairment of which perseveration is symptomatic” (p. 72). Moses et al. recommended that, after diagnosing the presence and type of perseveration, the clinician should (pp. 72–73)
• Increase the activation of the target. By providing specific cues that are adequate for
the PWA, the clinician can increase the activation level for the target word, which
should result in the production of the correct name. This suggestion is in line with
the view that the activation of the target word is insufficient.

• Not provide more activation to the perseveration. The therapist should avoid using
the perseverated word and should not produce it when providing the PWA with
feedback or assistance. The therapist’s use of the word would draw more attention
to the perseveration, which would thus receive more activation.

• Provide alternative communicative strategies. If the therapist cannot elicit the target
word by providing (a) cue(s) to the PWA, then the therapist should resort to other
strategies, such as providing a circumlocution or gesture to elicit the target word or
instructing the PWA to acknowledge that he/she does not know the word.

• Encourage self-monitoring. One aim of therapy should be to develop the PWA’s
ability to self-monitor and self-correct errors. The authors suggested that the
therapist encourage the PWA to stop and think before producing a response, in the
hope that the PWA will produce the target word or, possibly, state that he/she does
not know the answer.

Finally, the authors suggested the therapist educate family members and caregivers
about perseveration.

Basso (2004) presented a study of 50 PWAs with perseveration, including a description
of therapy administered to 2 PWAs who showed a high rate of perseveration. She explicitly
stated that, by treating the underlying deficits, the clinician would observe a reduction in the
PWA’s perseverative behavior.

Treated Subject 1 (TS1) revealed transcortical sensory aphasia with a severe
impairment of the lexical-semantic system and preserved sublexical processing for the most
part. He perseverated in all production and comprehension tasks, except for repetition, reading
aloud, and writing to dictation. The therapy provided to TS1 was reported in Papagno and
Basso (1996). The authors aimed their therapy specifically at the impaired semantic system,
because perseverations were produced only when TS1 was unable to produce the correct
response. The perseverations first disappeared in pointing tasks, followed by written naming
tasks. The authors reported that “TS1 showed a slow but progressive improvement and
simultaneous reduction of semantic errors and perseverations” (p. 383). Therapy with TS1
continued for 2 years, and, at the last control, he had mild Wernicke’s aphasia with rare
semantic errors and word-finding difficulties.

Treated Subject 2 (TS2) had mild Wernicke’s aphasia with agraphia. She also revealed
damage at the level of the semantic system, which presented in the form of semantic errors in
naming. TS2’s writing impairment was more severe; the authors ascribed it to a deficit in the
output buffer. She perseverated on all writing tasks. TS2 received treatment for her output
buffer; the result was a great reduction of perseverative responses in writing.

**An Illustrative Example**

MV is a 69-year-old, German-speaking female with a doctorate in pharmacy. MV had
worked as a pharmacist in her own pharmacy until she suffered a stroke. She presented with a
severe Wernicke’s aphasia subsequent to a territorial infarct of the left middle cerebral artery
with right hemiparesis. CT examination showed an ischemic lesion in the left middle cerebral
artery and hypodensity in the left basal ganglia area. At 6 months post-stroke, she required a
shunt operation (Medos-Shunt system right frontal). Following her discharge from the clinic,
staff initiated language testing and therapy at our unit.

Extensive language testing revealed that MV’s main language processing difficulty was
in the lexical retrieval of verbs, particularly when she orally produced sentences. Pre- and post-
therapy assessment included administration of the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983), action naming (Obler & Albert, 1979), the Amsterdam-Nijmegen Everyday Language Test (ANELT; Blomert, 1992), auditory sentence production and comprehension tasks (Stark, 1997b), picture descriptions (Cookie Theft from the BDAE [Goodglass & Kaplan, 2003] and from the Binetarium [Norden, 1953]), and narratives produced to picture sequences (Wechsler Intelligence Scale for Children [WISC]; Wechsler, 1949).

The results from the standardized aphasia examination that was administered pre-therapy (Test 1) and post-therapy (Test 2)—the Aachen Aphasia Test (AAT)—are shown in Figures 1 and 2, respectively. At 7 months post-onset (MPO), the subject took an AAT that revealed Wernicke’s aphasia. At 12 MPO (Test 2), after she had received 60 therapy sessions (i.e., post-therapy), the subject was revealed to have minor language difficulties. Her main difficulty was on the naming subtest (Benennen), which consisted of pictured objects to be named as simple nouns, compound nouns, colors, and sentence naming. She scored 59 points out of 120. On the repetition subtest for phonemes, one-syllable, loan words, compound words, and sentences (Nachsprechen), her score was 108 out of 150 attainable points. On the Token Test (TT) comprehension subtest (SV, auditory word and sentence comprehension) and written language subtest (SCHRIFT, reading aloud words and sentences), she showed a mild impairment. Post-therapy test results on the AAT are shown in Figure 2. MV’s performance on the naming (BEN) and repetition (NACH) tasks showed a mild impairment. Her performance on the other subtests showed no impairment.
Figure 1. Results from the pre-therapy language assessment for the Aachen Aphasia Test (AAT) at 7 MPO

AATP Für Windows
-Auswertungsprogramm für den Aachen Aphasie Test-
T-Wert Profil der Untertests

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<th>M., V.</th>
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<td>Untersuchung:</td>
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<td>Geburtsdatum:</td>
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<td>Alter (T/M/J):</td>
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<td>Untersucher:</td>
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<tr>
<td>Vergleichsdatum:</td>
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![T-Wert Profil der Untertests](image)

Einzelfalldiagnostische Ergebnisse:

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<th>SCHRIFT</th>
<th>SV</th>
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<td>(50)</td>
<td>(57)</td>
<td>(50)</td>
<td>(60)</td>
</tr>
</tbody>
</table>

Druckdatum 30.08.2011

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53227 Bonn
Tel.: (0228) 97199-0
Fax: (0228) 97199-99
Figure 2. Results from the post-therapy language assessment for the Aachen Aphasia Test (AAT) at 12 MPO

AATP Für Windows
-Auswertungsprogramm für den Aachener Aphasie Test-
T-Wert Profil der Untertests

Patient: M. V.
Adresse: Wien
Patienten-ID: 98
Untersuchung: 2

Geburtsdatum: 06.05.1924
Alter (T/M/J): 26/06/69
Beginn der Aphasie: 12.01.1993
Dauer (T/M/J): 20/10/00

Untersucher: SYSADMIN
Vergleichsdatum: 02.12.1993

Druckdatum 30.08.2011
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160
The focus of therapy in the first therapy protocol was to improve the client’s word-finding for verbs in a (natural) sentential context. The first protocol administered to MV was the Everyday Life Activities (ELA)-Syntax Therapy Protocol, which consisted of 60 1-hour sessions three times a week.

The goal of this program is to improve the essential components of oral sentence production; the program uses picture stimuli depicting everyday life activities. Picture stimuli are from the ELA photo series (Stark, 1992, 1995, 1997a). Each session has the same overall structure and consists of this sequence of steps:

- **Memory, last session:** At the beginning of a new session, after the therapist had greeted MV and they had carried on a brief conversation, the therapist asked the client to recall the sentences she had practiced in the previous session.

- **Old cards:** The therapist tested oral sentence production, using the photo cards worked on in the last session. The therapist asked MV to say what is happening on each photo card at least twice (10 cards in MV’s case).

- **New cards, constructing/building a sentence:** In each session, the therapist and MV used 10 new picture stimuli varying in verb argument structure and semantic reversibility. MV was asked to describe what is happening on a picture card. She worked intensively, using multiple repetitions for each card.

- **Taking apart the sentence:** The therapist asked randomly ordered questions regarding the verb and the thematic roles (“Who is doing something?” “What activity is the person doing?” etc.). Afterward, MV was asked to say the entire sentence once again. Steps 3 and 4 were administered successively for all the cards.

- **Auditory comprehension check:** All photo cards were placed on the table in front of MV, and she was asked to point to the card that matched the sentence spoken by the therapist.

- **New cards, second time:** Each of the (new) photo cards was shown again individually, and MV was asked to produce a sentence about what is happening (i.e., depicted). Each sentence was produced at least twice. The therapist provided assistance when MV demonstrated difficulty responding.

- **Memory, new cards:** At the end of the session, MV was asked to recall the (new) sentences she had worked on during that session. The therapist gave cue(s) after she had provided her version.

Examples of perseveration of a verb from her oral sentence production in an early therapy session include:

- “Der Bub gibt (target: ‘nimmt’) einen Teller aus dem Kasten” [E.: The boy is giving (for target: ‘taking’) a plate out of the cupboard] → Incorrect verb

- “Die Frau gibt (target: ‘steckt . . . ein’) den Stecker in die Steckdose” [E.: The woman is giving (for target: ‘putting . . . in’) the plug into the outlet] → Pers.


  The first verb was incorrectly produced as “give” in place of “take,” which was worked on. In sentences to the following picture stimuli, she perseverated the verb “give” in the third person singular form.

MV was given the homework assignment of writing down the sentences to submit at the next therapy session. (See also Stark, 2005, 2010.) Initially, she was able to recall 7 of the 10 sentences worked on in therapy, although the written versions exhibited paraphasias and perseverations. In later therapy sessions, she recalled all of the sentences with minor writing errors.
Initially, MV displayed a strong tendency to perseverate when she experienced difficulty retrieving a word (verb or noun); to address the problem, the therapist simultaneously asked her to take a deep breath whenever she noticed that she was having difficulties finding the word she wanted to produce or when she got “stuck” on a word. Because the therapist assumed that she was perseverating due to her primary word-finding difficulties, the therapist also assumed that her tendency to perseverate would become less as her lexical retrieval improved. This was the case. MV responded well to the therapy. To produce an illustrative example, after completing an orthographic transcription of the entire 1st and the 60th therapy sessions, the therapist analyzed the protocols according to the following variables: number of perseverative responses, anticipatory responses, phonological paraphasias, neologisms, semantic paraphasias, conduite d’approche behavior, self-corrections, and number of incorrect verbs.

Table 1. Comparison of MV’s language performance in the 1st and 60th therapy sessions for selected variables

<table>
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<tr>
<th>Analyzed Variables</th>
<th>1st Therapy Session</th>
<th>60th Therapy Session</th>
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</thead>
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<tr>
<td>Perseveration</td>
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<td>1</td>
</tr>
<tr>
<td>Phonol. paraphasia</td>
<td>45</td>
<td>4</td>
</tr>
<tr>
<td>Neologisms</td>
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<td>1</td>
</tr>
<tr>
<td>Semantic paraphasia</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>Conduite d’approche</td>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td>Self-correction</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Incorrect verbs</td>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>

A comparison of the 1st and 60th sessions revealed a marked decrease in number of errors for all of the analyzed variables related to the production of single nouns and verbs. The only increase—which is considered a positive change—was in the number of self-corrections. A decline in the number of perseverations was observed for other PWAs who were receiving intensive language therapy in our study of the long-term recovery of language functions in PWAs. MV received two other therapy protocols for improving her discourse level abilities (dialogue training and text production). She continued to improve, and perseveration was no longer a topic!

Discussion

From the survey of publications in which the terms perseveration and therapy and, in particular, therapy of perseveration are included, one can discern various ideas pertaining to the topic. Although the authors express their ideas differently or from different vantage points, there appears to be agreement on at least two points:

- General suggestions that apply not only to treating perseveration, but, overall, to providing language therapy to PWAs, include the allowing the PWA time to respond to an item and time between items. The therapist can also tell the PWA to take a deep breath and relax for a moment; start a brief conversation about the weather or some other light topic; or instruct the PWA to take a sip of water, tea, or coffee to distract him/her from the actual task. After a brief period, the therapy can be resumed.
Perseveration reflects the underlying impairment of the PWA. If that impairment is treated effectively, the tendency to perseverate (i.e., the number of perseverative responses) will decline. In the case of a good recovery, perseveration will be eliminated. The main goal is to select/construct and administer the right therapy protocol for each individual PWA and, in particular, bear in mind the status of the language processing system!

In the introductory paragraphs of this article, I stressed that only one published therapy protocol specifically focuses on perseveration. Considering the arguments put forward by Basso (2004), Stark (1984), Moses et al. (2004), and Tanaka, Albert, Fujita, Nonaka, and Yokoyama (2006), this assertion is reasonable: If therapy focuses on the deficit(s), then—as the authors assumed—the perseverative responses will decline. Even with regard to Helm-Estabrooks et al.’s (1987) TAP procedure, the authors pointed out that TAP therapy addressed the specific language processing difficulties of the participants.

The question whether therapy works—is efficacious or is effective—has been asked over and over again. As Basso (2005) rightly stresses, there is convincing evidence that treatment is effective. Although treatment outcome research is important, Basso asserts that there are other questions of equal importance: “The content of therapy has not aroused as much interest as whether or not therapy is efficacious, but it goes without saying that efficacy mainly depends on what is done, and not for how long or with what frequency it is done. We now know a lot about aphasic disorders and we should concentrate our efforts on understanding what treatment is beneficial to such and such functional damage and why” (p. 983). This assertion is particularly important with regard to treatment of perseveration: Analysis of the structure and content of the therapy provided to PWAs with a moderate to severe degree of perseveration is crucial to the therapist’s gaining insight into the intricate mechanisms of perseveration. By determining why the therapy did or did not work, researchers will advance our knowledge about the cause of perseveration and how to provide optimal language therapy for the specific underlying deficits and, thus, by doing so, reduce or eliminate perseveration.

In Stark (2011), three historical accounts of perseveration are discussed. These accounts have implications for the treatment of perseveration in individual cases of aphasia in that they point to the possible ways the language processing system can be impaired with regard to the activation of the affected language units:

- There is weak activation (i.e., not enough activation to result in the selection and production of the correct language unit).
- The decay rate following activation diminishes too quickly.
- The decay rate following activation lingers and diminishes too slowly.

Thus, these parameters apply to therapy for the actual deficits.

Gonzalez-Rothi (2008) warns that, in the process of determining the best language therapy program/concept for a PWA, we have to find out not only what works in therapy, but, possibly even more important, what may be detrimental. Perseveration is definitely an area where it would be important to know what should be avoided. Morganstein and Certner-Smith’s (2008) suggestion not to administer their thematic language stimulation therapy program to a PWA exhibiting perseverative errors is a positive example. If a PWA’s difficulties become heightened and he/she perseverates when asked to produce semantically related words, it would be counterproductive to administer that protocol.

The PWA may exhibit a misperception about the cause of perseveration. Eisenson (1984) cites an exchange with his client:

In answer to my question, “What is the significance of perseveration in a learning situation?” a recovered aphasic [sic] replied, “It means that the therapist is not aware of what is going on with the patient. Good therapy avoids the need for perseveration. When it occurs, the therapist has failed to do a good job.” (p. 187)
The PWA apparently does not understand the cause of perseveration. The goal of “good therapy” is to ameliorate the PWA’s language processing deficits. Initially, perseveration may play a significant role, due to the primary language processing deficits and the degree of severity of the specific deficits. The therapist’s understanding of what is going on with a patient and the provision of therapy for the deficits are related issues. However, the situation is more complex. Even if the therapist is aware of the language processing difficulties, conceptualizing a therapy program to address the specific deficits is always a challenge, particularly when several deficits are present. In the framework of aphasia therapy as “hypothesis-testing” (Byng, 1993; Byng & Black, 1995), the therapist does not have a guarantee that the PWA will respond in the manner that he/she proposes on the basis of his/her hypothesis! The complexity and initial overlapping of deficits may make the therapy process for a specific deficit very challenging in the context of the overall picture.

Returning to the aforementioned question posed by Eisenson and his client’s response, my response to a PWA, who, for example, has word-retrieval difficulties would be: “One of your main problems is that you have difficulties finding and producing the correct words you need to name things. Because you have that problem (e.g., to name a picture), one of the last pictures you named is the word that you produce again. This is called perseveration. It’s not because you want to produce the same/incorrect word again. Rather, it just comes out when you try to name the new picture—when you cannot find the right word. We are now working on improving your naming problems, and when your ability to find and produce the correct word improves, perseveration will become less frequent or even disappear. Whenever you see a new picture and cannot find the right word, take your time and even take a deep breath and start over again.” Providing suggestions to PWAs and caregivers is advocated by several of the authors discussed in the previous sections.

In summary, that “dreaded word perseveration” will continue to remain a challenge for speech-language pathologists. However, the more that is understood about treating specific language deficits, the more adequately and systematically speech-language pathologists will be able to work at improving a PWA’s language skills and, thus, break through the barriers created by perseveration.

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References


Similarities and Differences Between Perseverative and Non-Perseverative Errors in Aphasia: Theoretical and Clinical Implications

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Temple University
Philadelphia, PA

Abstract

Researchers have learned much about the cognitive organization of the language system by studying speech errors made by speakers with and without aphasia. Some aspects of errors made in language production reflect linguistic properties of language (e.g., linguistic similarities between an intended word and the word that was produced in error). Other aspects reflect processes that enable production of language (e.g., substitutions or sequencing errors). A particularly intriguing class of error is perseveration, the unintended retrieval of words or sounds after they have been recently produced. Although the occurrence of perseverations is influenced by both linguistic and processing aspects of language production, these errors have been particularly instructive about the latter aspect. Martin and Dell (2007) proposed that word and sound perseverations result from the same mechanisms as non-perseverative substitutions: slowed activation of the intended utterance and linguistic similarity between the target and error. They differ from non-perseverative substitutions in their probability of occurrence, which is increased by residual activation following their recent production. In this article, I will review this account of perseverations and discuss its implications for treatment approaches to reduce perseverations.

Theories of the cognitive organization of language processing have long been informed by speech errors made in everyday conversations. Such errors involve substitutions of words and sounds or movement of sounds, morphemes, words, and even phrases. The usefulness of this dataset lies in the observation that errors follow certain regularities. For example, slips of the tongue involving the exchange of phonemes (e.g., left hemisphere → heft lemisphere) are often characterized by a repeated phoneme next to the exchanging ones. The vowel /E/ in the above example is next to each of the exchanging sounds, /l/ and /h/ (Dell, 1986). Also, they often move to the identical position of the other word or syllable within that word (initial position in this example). Phonological errors are more common if the outcome error is a word (e.g., kitchen → chicken, or flake of snow → snake of flow). This phenomenon is known as the lexical bias effect and has been used as evidence that activated representations at phonological and lexical levels interact with each other before a word is selected for production (e.g., Baars, Motley, & MacKay, 1975; Dell, 1986). Word level errors also follow some predictable patterns. Word substitutions are often semantically and/or phonologically related to the intended target word. This phenomenon provides confirming evidence for two stages of word retrieval—semantic and phonological—that are hypothesized in most models of language processing: (a) retrieval of the word as an abstract syntactic-semantic entity and (b) retrieval of its sounds.
(Dell, 1986; Fromkin, 1971; Garrett, 1975; Levelt, Roelofs, & Meyer, 1999). Semantically related word substitutions (horse → cow) occur during the first stage, and phonologically related word substitutions (e.g., horse → house) occur at the second stage (Fromkin, 1971). There are also mixed word substitutions, which share meaning and sounds of the intended utterance (e.g., truck → train). Mixed errors have been shown to be more probable than word substitutions that overlap just in meaning or just in sound (Dell & Reich, 1981; Harley, 1984; Martin, Gagnon, Schwartz, Dell, & Saffran, 1996; Martin, Weisberg, & Saffran, 1989). This phenomenon provides additional evidence of interaction in the word-retrieval system; in this instance, it shows semantic and lexical-phonological levels of representation during word production.

Patterns of regularities in error production, such as the examples above, have been interpreted in the context of a model of word production that involves a competitive activation process in which the target word must compete with other semantically and/or phonologically related words that are activated during the word-retrieval process (e.g., Dell & O'Seaghdha, 1992; Martin & Saffran, 1992). In the process of retrieving a target word (e.g., apple), other semantic and phonological neighbors of that word are also activated (e.g., orange, ankle). Additionally, other words that have been spoken recently or are intended to be spoken in the very near future are also somewhat activated. If the recently activated utterance is selected in error, this is a perseverative intrusion (e.g., “Today's lecture will be about the lecture . . . I mean the legislature”). When an utterance to be spoken is retrieved too soon, the result is an anticipatory intrusion (e.g., “Today's legislature . . . today's lecture will be about the legislature”). This review will focus on the first of these movement errors—perseveration of words, or sounds spoken prior to the current target sounds or word—and how they relate to non-perseverative word and sound substitutions. I will review results of two studies by Martin and Dell (2004, 2007) that support an account of perseverations in the context of an interactive activation (IA) model (e.g., Dell, Schwartz, Martin, Saffran, & Gagnon, 1997) and a related model of serial order in language production (Dell, Burger, & Švec, 1997). These models attribute the occurrence of word and sound perseverations to the same mechanisms as non-perseverative errors, but with an additional component. Over the course of the competitive activation process described above, if the activation of the target word is weak or slowed, other related word representations could surpass its activation level and be selected instead of the intended word. Perseverations also occur when activation of the target word is weak, but there is an additional factor that contributes to their probability of being selected in error: residual activation from their recent selection (i.e., they were spoken recently). Thus, potential perseverated words and sounds participate in the competitive activation process but have an additional boost of activation from being recently activated. As described below, there is evidence that their probability of intruding on the targeted word is further enhanced if they are semantically or phonologically related to the target word.

**The IA Model**

The IA model of word retrieval has been widely documented and has gained much support from the study of naturally occurring speech errors (Dell, 1986), experimentally generated speech errors (Martin et al., 1989; Dell et al., 1997, tongue twister data), and error patterns observed in aphasia (Martin & Saffran, 1992; Martin, Dell, Saffran, & Schwartz, 1994; Martin, Saffran, & Dell, 1996; Dell et al., 1997; Dell, Martin, & Schwartz, 2007; Martin & Dell, 2004, 2007; Schwartz, Saffran, Bloch, & Dell, 1994; Schwartz, Dell, Martin, Gahl, & Sobel, 2006). Figure 1 shows a standard depiction of the IA model.
A depiction of a model of word production that includes all of the features of a standard interactive activation model as proposed by Dell and O'Seaghdha (1992). The word intended to be spoken is cat. Other words in the figure represent the activation of words that are semantically and/or phonologically related or unrelated to the target word.

There are three levels of representation networks shown: semantic, lexical, and phonological. In addition, there is a conceptual (nonlinguistic) level from which the concepts initiate a word-retrieval event. Word retrieval occurs in two stages, each of which involves interaction among the levels of representation. In the first stage, a concept is linked to its semantic features and these spread activation forward to the associated word (cat) representation in the lexicon, as well as other words that are semantically related to that word (e.g., dog). This activation continues to spread forward to the phonological network, priming (stimulating) activation of the sounds of the word. At the same time, activation from the lexicon feeds back to the semantic level to ensure maintenance of the activated semantic features. Also, activation from the phonemes primed in the phonological network feeds back to the lexicon to ensure maintenance of activation of the word representation and, at the same time, spreads activation to phonologically related words in the lexicon.

This feedforward/feedback activity continues until it is time for the speaker to retrieve the word. At that moment, the most activated word in the lexicon is selected and, in the second stage, phonologically encoded. The activation spread through the network is modulated by two processing parameters: activation strength and rate of decay. These two parameters are necessary in a competitive activation model. The decay rate keeps activation from overaccumulating, and the strength parameter makes sure that activation is maintained. The two activities work together to balance the levels of activation in favor of the target word, the intended utterance.
Dell, Burger, and Švec (1997) introduced a model that addresses serial order of utterances and the temporal course of lexical activation. They proposed that there are three phases of lexical activation at any given time: past activation, present activation, and future activation. These three phases reflect the fact that production of words takes place over time. After a word has been retrieved and produced, its activation recedes toward its resting state. While the current word to be retrieved is being activated and competing with other words in the lexicon, the next word to be spoken is beginning to activate as well. When lexical retrieval proceeds smoothly, activation of the past word is at a low level (but above resting state), activation of the present target word is at the highest level, and activation of the future word to be spoken is elevated (less than the current target, but more than the previously spoken word). This ensures that the current target word is retrieved and that the next word to be spoken is approaching sufficient activation level, to be retrieved when needed.

**Errors in Activation Processes**

I have described two aspects of lexical retrieval: (a) the feedforward/feedback activation cycles across the semantic-lexical-phonological network and (b) the effects of time on relative activation levels of the current intended utterance and past and future planned utterances. The first aspect provides an account of the occurrence of word substitutions that may or may not have been spoken recently. Most often, they are related to the intended word semantically or phonologically and have been primed by its spreading activation. When the second aspect of lexical retrieval is considered along with the first, the stage is set for the occurrence of perseverations or anticipations. Words that have been spoken recently have some residual activation. Those that are part of the speaker’s forward plan are somewhat active as the lexical retrieval system prepares for the next utterance. If the activation of the current target is weak, the recently spoken or upcoming planned word may be retrieved instead of the target word and result in a perseveration or anticipation error, respectively.

Perseverative word substitutions would not necessarily be linguistically related to the target word. However, in a study of three individuals with aphasia and high perseveration rates, Martin, Roach, Brecher, and Lowery (1998) showed that their perseverated utterances in a picture-naming task were hierarchically organized as a function of two factors: (a) their relationship to the target (semantic, phonological, semantic + phonological, or unrelated) and (b) how recently they had been spoken prior to the current target word. Martin et al.’s (1998) measure of temporal distance between the current picture to be named and the last prior production of the name that intruded as a perseveration was the number of naming attempts between those two points in time. Perseverations unrelated to the current target picture name had been spoken most recently (as a name of another picture), and perseverations that were semantically and phonologically related to the target had been previously spoken least recently. That is, they had the greatest temporal distance between the current target and the perseverative intrusions most recent prior utterance. The temporal distance of perseverations that were just semantically or just phonologically related to the target name was somewhere in between these two extremes. These data are shown in Table 1. The rates of each relationship category of perseverations varied across participants. Whereas VP and WR produced more unrelated perseverations (.47 and .52, respectively), JG produced more semantically related perseverations.
**Table 1. Relationship of Target Picture Name and the Perseverative Intrusion**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Unrelated</th>
<th>Phonological</th>
<th>Semantic</th>
<th>Semantic + Phonological</th>
</tr>
</thead>
<tbody>
<tr>
<td>JG</td>
<td>1.50</td>
<td>48.10</td>
<td>150.10</td>
<td>322.00</td>
</tr>
<tr>
<td>VP</td>
<td>13.05</td>
<td>28.58</td>
<td>42.58</td>
<td>56.44</td>
</tr>
<tr>
<td>WR</td>
<td>51.06</td>
<td>45.76</td>
<td>161.14</td>
<td>150.75</td>
</tr>
</tbody>
</table>

Mean number of intervening utterance (naming attempts) between the last prior occurrence of a perseveration and the current target picture name that it replaced as a function of relationship between the target and the perseveration (adapted from Martin, Roach, Brecher, & Lowery, 1998).

These results provide evidence that the occurrence of word perseverations in the context of a picture-naming task is influenced by two factors: recency of prior activation and linguistic relationship of the perseveration with the current target. Among these three individuals, these two factors co-vary in their influence on probability of a perseverative intrusion. That is, except for WR, perseverative intrusions with no relationship to the target were previously produced most recently before the current target was presented for naming. And, for all 3 participants, perseverations that were most linguistically related to the target were previously spoken much earlier than the other categories of perseveration. Recency of activation affects the amount of residual activation of the potential perseveration, and the linguistic relationship with the target attracts additional activation via the spreading activation process.

If we consider the perseverations that are just semantically related and just phonologically related to the intended word, it seems clear that a semantic relationship facilitates perseveration of words spoken considerably earlier in the picture-naming task than a phonological relationship. What is the significance of this pattern? One possibility is that semantic relationships among words are stronger than phonological relationships. That is, they generate more or stronger connections with other related words during the spreading activation process. In a picture-naming task, this would be a reasonable hypothesis, as semantic activation is primary and drives the naming process. In contrast, if the task were to repeat words, in which activation of phonological representations is primary, this pattern might be reversed. That is, phonological similarity of a previously spoken word and the intended utterance would have greater influence on the occurrence of a perseveration than semantic similarity. Future investigations are needed to confirm this hypothesis. However, such a finding would indicate another way in which naturally occurring speech errors can inform models of word processing.

**Additional Evidence**

The account of perseverations in picture naming advanced by Martin et al. (1998) includes three elements: (a) weak activation of the current target, (b) the linguistic relationship of the current target word and potential perseveration, and (c) residual activation of the recently spoken potential perseverative intrusion. Non-perseverative substitutions are attributed to the first two of these elements. Martin and Dell (2007) examined other aspects of perseverative and non-perseverative substitutions to explore the hypothesis that the two are generated by the same mechanism—weak activation of the intended word in the context of a competition from other activated words. They examined parallels between the occurrence of perseverative and non-perseverative naming errors (word and sound substitutions) of 94 individuals with aphasia in a picture-naming task (data from Schwartz et al., 2006). They analyzed these errors in the context of the IA model of word retrieval (Dell et al., 1997; Schwartz et al., 2006) described earlier. That model has been computationally instantiated and has been used successfully to model the naming error patterns of these 94 individuals with
aphasia (Schwartz et al., 2006), as well as others from previous studies (e.g., Martin, Saffran, & Dell, 1996; Dell et al., 1997). In the Schwartz et al. (2006) study, the aphasic naming deficits were modeled as lesions to two parameters of the model: the s parameter (connection strength between the semantic and lexical levels of representation) and/or the p parameter (connection strength between the lexical and phonological levels of representation). Lesions are manifested as reductions in the weights of the connections, s weight and p weight.

In their analyses of these data, Martin and Dell (2007) explored three predictions. Their first prediction focused on the relationships of s and p weights with error type. Specifically, they predicted that (a) lesions of the s parameter (reduced s weight) would correlate with rates of both perseverative and non-perseverative whole-word substitutions and (b) lesions of the p parameter (reduced p weight) would correlate with perseverative and non-perseverative sound substitutions. The critical aspect of this prediction was the similarity between rates of perseverative and non-perseverative errors. For the most part, the results followed the predicted patterns. Perseverative word errors that held a semantic, phonological, or mixed relationship with the target word or were unrelated were strongly correlated with s weights. This same pattern held for non-perseverative word substitutions, except for the phonologically related word errors. The rates of nonword errors (perseverative and non-perseverative) were also found to correlate with p weights of participants in the study, but not their s weights.

Martin and Dell’s (2007) second prediction focused on the distributions of perseverative and non-perseverative word errors across error classes, including semantic, formal, mixed, and unrelated word errors and nonword errors. Specifically, they predicted that the rates of each class of word errors would be similar for perseverative and non-perseverative word substitutions. This prediction also was upheld. For all categories of error, rates of perseverative and non-perseverative errors were correlated positively and significantly. Thus, although individuals may differ in the kinds of word errors they tend to make (e.g., more semantically than phonologically related or vice versa), the pattern of responses across error types will be similar.

Finally, Martin and Dell (2007) examined rates of “no response”—type errors and descriptions (circumlocution) errors in relation to rates of whole-word perseverations. They predicted that these two error types would correlate with rates of whole-word perseverations. This prediction was based on the hypothesis that both error types are due to weak activation of the connections between semantics and the word-form representation of the intended word. The analysis confirmed this prediction; rates of “no responses” and descriptions correlated with whole-word perseverations but not sound perseverations. Also, rates of all three error types correlated significantly with the s weights used to fit each participant’s naming response pattern to the IA model.

**Theoretical and Clinical Implications**

The data from Martin et al. (1998) and Martin and Dell (2007) provide evidence that perseverative and non-perseverative errors are more alike than different. Apart from the input of their residual activation, perseverations appear to behave like ordinary word substitutions, which are influenced by the linguistic relationship between words and by type of lexical impairment present in the aphasia (semantic and/or phonological). Thus, when connections between the semantics of the target word and the word form itself are weak, the speaker will produce a substitution, a “no response,” or will provide a description of the target word’s underlying concept. For people with aphasia, the weak s weights would be attributed to the brain damage incurred. In unimpaired speakers, increased rates of speech leading to speed stress or unfamiliarity with the word or sound sequence could cause a reduction in s weights (Schwartz et al., 1994).

The results of these studies have clinical implications as well. Perseverations are common in aphasia, and the patterns observed here provide valuable clinical markers that
should help in diagnosis of aphasia type. If a client produces whole-word perseverations in the context of reasonably good comprehension and also produces “no response” errors and circumlocutions, a diagnosticians might suspect impairment affecting semantic → lexical output connections. If relatively more sound perseverations errors are present in picture naming, there will likely be more nonword errors in general, suggesting a breakdown of connections between the lexicon and the phonological network. Thus, perseveration data from picture-naming tasks are relevant to diagnosis of the locus of word-retrieval difficulties.

Although the picture-naming task provides a useful means for observing factors that facilitate the occurrence of perseverations, this is not the only language context in which perseverations occur. For example, in spontaneous speech or narrative speech, there is no single concept to link with a word as in picture naming. In this context, factors that instigate a perseveration are less obvious. Moreover, patterns of perseveration may differ if the lesion in aphasia affects input processing as well as output processing. If input processing is impaired, self-monitoring of output might also be impaired. Perseverations in this situation might be less obviously related to any particular target, and a particular word or phrase might persist throughout the narrative. Below is a narrative sample from KX, a woman with moderate to severe Wernicke’s aphasia following a cerebrovascular accident (CVA). She was asked to relate her typical activities on Sundays. (Repeated utterances are italicized.)

**Examiner:** Tell me what you usually do on Sundays. We’re not writing it. I just want you to tell me.

**KX:** I (I) usually . . . I (I) usually (um s op open) open my (my) first door. And I sat there and open the door. And like to know what’s turn the door. And like to know what’s happening. To know what’s happening. I usually watch the show and I like to know the um. It’s usually the show watching the group. I always watch the group. And (and) I always watch to know the group. The group where I know what. I did watch the British group. Not and the other group which knows what’s happening on that group. The British group. And I always know what’s happening in that part of the world.

**Examiner:** Okay.

**KX:** And also [yours] the other group. And I (I) watch the type of show which watches my group here. And this is the group. And I (I) like listening to the news of the other groups that tell you one another the differently and tell you the difference of the group and I listen to them. I like the way they talk to each other.

**Examiner:** Okay.

**KX:** The groups. I listen to the sounds of the groups of the people. I find it interesting. I said those groups all the time. And then . . . Except these different groups here. And then after a while I sit and watch the news by myself. And then I’ll (then I) watch part of the news. And eat some of my original local food with my (with my) local um. Food telling me all the local. My food so I can tell the different. My food to eat what (what) I’m eating. My local food here. And (um and) I just start wadding different foods to know what’s happening in this part of my world. I always watch the news. I watch constantly food. And it’s always other parts of world foods. That I’m was reading news.

**Examiner:** Good.

It seems evident that KX has a story to tell about how she spends her Sundays. Yet, there are several words used over and over (marked in italics) that are, in some sense, appropriate, but do not provide enough information to be sure of her activities. We can guess that she watches news programs, and she finally uses the word news toward the end. The word group is used the most often, and this is somewhat appropriate if she is watching news discussion shows such as *Meet the Press*. The words used in the narrative, however, do not make this clear.
Several questions arise when reviewing a sample like this. Do these perseverations arise from the same mechanism described by Dell, Burger, and Švec (1997) and Martin and Dell (2004, 2007)? How would their model account for the persistent intrusion of a single word throughout a narrative? Certainly the word *group*, for example, is produced in place of a target word, but is it the same target with each utterance? Notably, KX makes no obvious effort to correct her errors. This pattern is consistent with poor monitoring abilities that are common in Wernicke’s aphasia. For a model to account for the recurring perseverations, it might include a role of self-monitoring impairment, as well as the effects of weak activation of an intended word. Additionally, when a word is persistently uttered in place of an intended word in spontaneous speech, it is likely that its lexical representation becomes strongly activated, making it a “formidable” competitor in a competitive activation retrieval process, which, in turn, increases the probability of its being selected for production. Further investigation of the role of self-monitoring and the occurrence of perseverations is needed to answer these questions.

**Conclusion**

Perseverative and non-perseverative errors result from several factors that combine to reflect the probability of occurrence and type of relationship to the target word: (a) locus of impairment in the word-retrieval system, (b) relationship of the substitution to the target word, and (c) weak activation of the current target. The occurrence of perseveration is influenced by a fourth factor: (d) recency of activation, which determines the degree of a word’s residual activation in the lexicon. Researchers who carried out the studies reviewed here have identified these factors in the context of picture-naming tasks and in cases of word-production impairments, without considering the potential role of input-processing impairment and its effect on self-monitoring of perseverative errors. Additional research is needed to extend this model to narrative and spontaneous speech and to determine whether impaired self-monitoring of language output affects the pattern of perseveration observed in aphasia.

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**References**


Reducing Aphasic Perseverations: A Case Study

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Abstract

The purpose of this study was to measure outcomes resulting from a treatment designed to reduce aphasic perseverations by decreasing activation of the perseverative response and increasing activation of the target response. A single-subject design was used. A Spanish-speaking male with moderate-to-severe receptive-expressive aphasia participated in this study. Treatment involved the use of systematic reduction of interstimulus interval paired with semantic feature analysis. The treatment resulted in a decrease in perseveration, but only minor increases in naming accuracy on trained and untrained stimuli. In addition, an increase in overall verbal output was observed. Decreased perseveration was maintained during follow-up. Outcomes suggest the treatment successfully reduces perseveration and increases verbal output. Additional research is needed to evaluate the effectiveness of this treatment.

Perseveration may be experienced to varying degrees by the majority of individuals with aphasia. Unfortunately, the evidence for effective or efficacious treatments is limited (Basso, 2004; Helm-Estabrooks, Emery, & Albert, 1978). Hence, although they strive to use evidence-based practice, clinicians must instead rely more heavily on clinical expertise to guide them. In the absence of extensive treatment research, clinicians can make informed decisions regarding the treatment of patients who perseverate by developing a theoretical understanding of perseveration, using that understanding to guide treatment planning, and gathering outcome data to quantify the results of the treatment. It was such a process that led to the development of the treatment investigated in this study—that is, a treatment to reduce aphasic perseverations (Muñoz & Burchfield, 2006).

Perseveration is an “inappropriate repetition or continuation of a previous response when a different response is expected” (Gotts, della Rocchetta, & Cipolotti, 2002, p. 1930). Sandson and Albert (1987) proposed three types of perseveration: recurrent, continuous, and stuck-in-set. Recurrent perseverations, or the repetition of a previous response to a different subsequent stimulus, are the most common type seen in aphasia (Helm-Estabrooks, Ramage, Bayles, & Cruz, 1998; Sandson & Albert, 1987).

Activation theories of lexical retrieval provide one avenue for explaining recurrent perseverations. Lexical retrieval results from the increasing activation of target items occurring in parallel with the diminishing activation of prior responses (Dell, Burger, & Svec, 1997). The normal lexical access system has three main functions: activation of the present, deactivation of the past, and priming for the future (Dell, Burger, & Svec, 1997). One theory suggests that recurrent perseverations result from the same underlying mechanisms that cause other errors: in effect, a disruption of activation and inhibitory mechanisms inherent in normal lexical retrieval (Martin, Roach, Brecher, & Lowery, 1998). Weak activation of the target in the context
of competition, coupled with increased activation of an alternate (often phonologically or semantically related) response, leads to an error (Martin & Dell, 2007). In the case of perseveration, residual activation potential for a recently spoken word leads to the repetition of a previous response (Martin & Dell, 2007).

A treatment designed to improve the efficiency of lexical retrieval can also be used specifically to reduce perseveration (Helm-Estabrooks et al., 1978) or target the underlying cause of the hypothesized breakdown in lexical retrieval, which would indirectly reduce perseveration (Basso, 2004). Given that perseveration is theorized to result from underactivation of the target, coupled with persistent activation of perseverative response, a patient might benefit from a treatment that targets both components underlying the error. In response to patient needs, my colleague and I piloted such a treatment and found that it successfully decreased recurrent perseverations and increased verbal output (Muñoz & Burchfield, 2006). Based on trial and error, the treatment protocol has been refined to improve efficiency. The purpose of this study is to present the treatment protocol and its outcomes.

**Purpose and Research Questions**

A single-subject design was used to measure outcomes from a treatment to reduce aphasic perseverations by decreasing activation of the perseverative response and increasing activation of the target response. Treatment involved the use of a systematic manipulation of interstimulus interval (to reduce persistent activation) paired with semantic feature analysis (to strengthen the activation of target responses). Two research questions were addressed:

1. Does the treatment decrease the frequency of perseverations for trained and untrained stimuli?
2. Does the treatment increase the frequency of correct naming for trained and untrained stimuli?

**Method**

SC was a 43-year-old, right-handed Hispanic male. He was evaluated 8 months post-onset of a subarachnoid hemorrhage that resulted from an aneurysm in the left posterior communicating artery. A radiological exam conducted following admission to the hospital indicated areas of low density in the left frontal operculum and insula and left paramedian frontal lobe.

SC was raised and educated in Mexico. Prior to the stroke, he had worked in the United States for 8 years and was conversationally fluent in English, though he possessed a strong accent. After the stroke, he spoke only Spanish. All testing was conducted in Spanish. Attempts to assess in English were discontinued due to SC’s lack of response.

SC exhibited a moderate-to-severe receptive-expressive aphasia as indicated by his performance on the Boston Diagnostic Aphasia Examination-3-Spanish (Goodglass & Kaplan, 2005). On the Boston Naming Test (BNT)-Spanish (Goodglass & Kaplan, 2005), he correctly named 0/60 items and produced perseverative responses on 31/60 items (51.6%).

Because of the frequency of perseveration and severe anomia evident in his conversational speech and the BNT results, we considered SC to be a candidate for treatment to reduce aphasic perseveration. We explained perseverance to SC and his wife and told them that SC perseverated (i.e., that he got stuck on a word and the other words were weak and could not come up). To explain the concept, we used the analogy (verbal and graphic) of a light bulb that would not turn off (the perseveration) and a bulb that was too dim (the target). They were told the purpose of the treatment was to turn off the perseveration and strengthen the target (i.e., make the light brighter), so SC would be able to say what he intended. SC and his wife were encouraged to ask questions.
**Treatment**

The perseveration treatment consisted of two components: manipulation of the interstimulus interval and semantic feature analysis (SFA; Boyle & Coelho, 1995). The first component involved the manipulation of the interstimulus interval (ISI) during a picture-naming task (a description of the stimuli is provided in the next section). The clinician asked the client to name the picture. The clinician increased or decreased the time interval before presenting the next picture, based on the occurrence or absence of a perseveration. Initially, an ISI of 20 seconds was provided between stimuli (Muñoz & Burchfield, 2006). The interval was reduced by 2 seconds if the participant responded without perseveration, regardless of the accuracy of the response. However, if the participant perseverated, the clinician increased the interval for the next picture stimuli by 2 seconds. The timing intervals in subsequent trials/sessions began at the last ISI recorded in the previous trial/session. During the ISI, the target or perseveration was not discussed. The clinician and client sat quietly or talked about relaxing and clearing the mind.

In the second component, the clinician reviewed incorrectly named items using a semantic feature analysis (Coppens & Mylott, 2006) translated to Spanish. The participant was asked to identify attributes of the object, such as its function and physical properties. The attributes corresponding to the picture stimuli were recorded by the clinician on the SFA sheet. The participant was encouraged to name the object during the description process. However, if the participant was unable to name the object, the clinician provided an article cue (el/la, un/una), then an initial syllable cue, and then the whole word. Once the participant has named the picture, he used it in two sentences (A ____ is _____, and I _____ with a _____.) The sentence completion task was added to facilitate generalization beyond the single word.

Sets of 10 pictures each were used during the treatment. One set was selected for training. The ISI manipulation was conducted with the 10 items in that set, then the SFA component was conducted with the items named incorrectly (regardless of perseveration). The participant and clinician then returned to the ISI component, starting with the ISI attained at the end of the previous trial. This cycle (ISI/SFA) was repeated for the same set until criterion for mastery was reached: 9/10 (90%) responses without perseveration (regardless of accuracy) or ISI < 2 seconds.

**Stimuli**

Fifty black-and-white line drawings (5 sets of 10 items each) were selected (Snodgrass & Vanderwart, 1980). Items that were in the BNT, Spanish/English cognates, or without a single-word label in Spanish, were excluded. Lists were balanced for semantic categories, familiarity (Sanfeliu & Fernandez, 1996), and number of syllables. Each picture measured approximately 3 inches in height and was printed on sheet of paper measuring 5.5” x 4.25”.

**Data Collection, Analysis, and Reliability**

In addition to the BNT, the clinician administered 50 potential stimuli items both prior to and following treatment. In addition, a stable baseline was established over three sessions prior to the start of treatment for Set 1. At the start of each treatment session, the clinician probed the participant’s performance on trained Set 1 and untrained Set 2. Data was collected on two dependent variables: number of items correctly named and number of perseverations. To measure generalization of increased naming accuracy and decreased perseveration to discourse, the clinician collected a sample pre- and post-treatment using the Cookie Theft Picture (Goodglass & Kaplan, 2005).

For the purpose of the study, a perseveration was defined as the whole- or part-word repetition of a previously occurring response or a recognized, commonly occurring perseveration (e.g., SC’s name, his most common perseveration). Each trial was considered independent of responses in other trials. If SC’s groping suggested a perseveration, but the word/part-word was not produced, it was not counted as a perseveration. Naming accuracy and perseverations were scored during the administration of the assessment and treatment. All
probes and pre- and post-testing were audiorecorded. Ten audiorecordings were randomly selected for transcription and scoring. Interjudge reliability was 99% for accuracy and 88% for perseverations.

**Results**

SC participated in a 2-hour treatment session once a week for 7 weeks. He was seen only once a week due to the distance he traveled. For additional support, his wife was trained on the task; they practiced once a day at home, using the training materials used in treatment.

A stable baseline for performance on Set 1 was established over three sessions for frequency of correct naming and frequency of perseverations. Accuracy was 0/10 correct on all three probes, and perseverations ranged from 7-9/10 (see Figure 1). Treatment was initiated after completion of the third baseline.

*Figure 1. Frequency of Perseverations and Accurate Naming on Set 1 (Trained) and Set 2 (Untrained)*

SC met the criterion for Set 1 in six sessions. During that time, accuracy increased from 0 to 3, and perseverations declined from 7 to 0. Over the course of treatment, decline in ISI was evident (from an average of 32 seconds during the first session to 1 second during the last sessions). During treatment, it was evident that SC was making an effort to suppress the perseveration. Oral groping was common, particularly in the early session. He sometimes would start to say the first sound of his most common perseverative response (his name), stop himself, and shake his head.
Generalization to Untrained Stimuli

Set 2 was probed weekly. SC’s perseverations declined on Set 2 during treatment of Set 1 (Figure 1), but accuracy evidenced little change. The BNT was re-administered at the end of the semester. Accuracy increased slightly (3/60), and perseverations decreased to 0/60 (see Table 1). Training sets 3-5 were also administered pre- and post-treatment, and decline in perseverations was also noted (see Table 1). A comparison of SC’s pre- and post-treatment response to the Cookie Theft Picture revealed that the number of content units doubled (from 4 to 8) and the number of part- and whole-word repetitions was halved (from 24 to 12).

Table 1. Pre- and Post-Treatment Assessment of Lexical Retrieval

<table>
<thead>
<tr>
<th></th>
<th>Pre-TX</th>
<th>Post-TX</th>
<th>2-month follow-up</th>
<th>5-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BNT (60 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Correct</td>
<td>0</td>
<td>2 (3%)</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Perseverations</td>
<td>31 (52%)</td>
<td>0</td>
<td>2 (3%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sets 3-4 (30 items)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Correct</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perseverations</td>
<td>16 (53%)</td>
<td>8 (26%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Discourse Sample (Cookie Theft)</strong></td>
<td>4</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content Units</td>
<td>24</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Social Validation and Maintenance

On initial evaluation, the patient and his wife reported that SC’s expressive language was extremely limited. His communication was functional due to his effective use of gestures, drawing, and facial expressions. His verbal communication consisted of a few frequently repeated words; however, he could not repeat a model provided by another person. Following treatment, the family reported that he was communicating more information verbally. As an example, they were surprised when they went to a restaurant and he was able to order for himself.

SC continued in treatment designed to improve his verbal output, reading, and writing. The BNT was re-administered several times. On subsequent administrations, confrontation naming continued to be limited, but the decline in the occurrence of perseverations was maintained (see Table 1).

Discussion

The administration of a treatment to reduce aphasic perseverations resulted in a long-term and generalized reduction in perseveration and increased verbal output but minimal improvement in confrontation naming. Results from this study raise issues related to the participant’s response to the treatment and the treatment protocol.

Moses, Nickels, and Sheard (2004) suggest several directions for intervention, including increasing the activation of the target, avoiding activation of the perseverative response, educating families and caregivers, facilitating self-monitoring, and providing alternate communicative strategies. Though this treatment was conceptualized prior to the publication of the Moses et al. paper, the underlying principles are similar and the results of this study provide support for the authors’ recommendations. The outcomes of this study, particularly in regard to reducing perseveration, may be attributed to the multifaceted nature of the
intervention. The first three recommendations are an integral aspect of the treatment to reduce aphasic perseveration and contributed to the observed outcomes.

The treatment fostered self-monitoring by increasing the client’s understanding and awareness of perseveration and using the ISI manipulation to give the client sufficient time to suppress the perseveration (resulting in no response or an alternative response). The evident groping and effortful suppression of the perseveration suggests that the participant was actively monitoring his response (Buckingham, 2007; Stark, 1988). Monitoring was clearly not at the pre-production, or subconscious, stage; it was evident that SC was suppressing the articulation of perseveration, at least early in the treatment. The ISI appeared to give SC time to monitor and repair pre-articulatory tendencies toward perseveration (Stark, 1988). Increased monitoring may also account for the systematic reduction in perseverations seen in the untrained stimulus Set 2.

Avoiding activation of the perseveration is a treatment objective that is difficult to quantify. Much like not thinking about pink elephants, instructing the client to avoid the perseveration gives it weight. Rather than avoiding activation of the perseveration, this treatment systematically manipulates the time required to reduce the activation of the perseverative response. The initial ISI required by SC to eliminate perseveration between pictures averaged 32 seconds (ranging as high as 56 seconds). The initial ISI of 20 seconds was selected on the basis of the initial piloting of the treatment (Muñoz & Burchfield, 2006). Corbett, Jefferies, and Lambon Ralph (2008) found that presentation rate had no significant impact on perseveration rate or accuracy; however, their “slow” time (5 seconds) was substantially lower than the initial ISI required by the participant in this study. The rate of decay of a perseverative response appears to vary and may be extremely slow. Facilitation of monitoring activities seems to make it possible to reduce the time required to deactivate the perseverative response.

Providing alternate communicative strategies was not directly targeted, but it is an outcome we are currently investigating with additional analyses of error type. Though naming accuracy on confrontation naming tasks showed minimal improvement, verbal output increased. SC said more and provided more information of use to the listener than his most common perseveration (i.e., his name). So, what did SC say? Our observations suggest that the SFA fostered the use of circumlocution, rather than retrieval of the specific lexical target, to convey meaning.

Results raise issues related to the value of the treatment itself, given that the reduction in perseverations was not accompanied by corresponding increases in accuracy on confrontation naming tasks. Also, the results might suggest that the treatment may be more complicated than it needs to be. Perhaps the manipulation of the ISI is sufficient to reduce the perseveration. Conversely, strengthening the semantic representations via SFA may be responsible for the observed treatment effects. More time spent on just SFA might have produced better outcomes for improving naming accuracy (and in the context of decreasing perseverations). Additional research is needed to enable researchers to sort through these issues. The current study and past piloting suggests that best outcomes are achieved in the shortest amount of time with the ISI/SFA combined approach.

A related issue is the validity of SFA as the component for strengthening the activation of the target response. SFA assumes a semantic component to the impairment, which may or may not be the underlying cause of a given patient’s anomia. A component that addresses the phonological aspects of lexical retrieval may be of benefit to some patients. The treatment protocol could involve more extensive testing to enable researchers to hypothesize the nature of the lexical impairment, as suggested by Moses, Sheard, and Nickels (2007). The second component of the treatment could then be selected based on this hypothesis (e.g., phonological and/or semantic approach).
Lack of improvement in naming accuracy might be attributable to the fact that the intervention was terminated after seven sessions due to the semester recess. On the basis of testing at the time of SC’s return to the clinic, the clinician determined that a treatment targeting perseveration was no longer warranted and shifted the focus to improving naming accuracy by using a combined phonemic and semantic approach (Muñoz, Suarez, & Cameron, 2010). As with the perseveration treatment, improvement on confrontation naming was minimal. Given that the patient described by Boyle and Coelho (1995) met criterion for mastery within seven sessions and SC’s lack of improvement given additional treatment, it is likely that lack of improvement in naming accuracy is a result of the task (e.g., confrontational naming) or failure of the treatment to target SC’s specific lexical deficit.

The results demonstrate positive outcomes in regard to reducing perseverations and increasing verbal output, though not naming accuracy. Additional research is needed to enable researchers to refine and test this treatment, particularly in regard to facilitating lexical retrieval, either by modifying the existing treatment or examining the next course of treatment once the patient has sufficiently reduced the occurrence of perseveration.

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References


Table 2. Examples of verbal perseveration on the various linguistic levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Nr.</th>
<th>Target form</th>
<th>Perseveration</th>
<th>Feature perseverated</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonological level:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Distinctive features:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intramorphic</td>
<td>1</td>
<td>Danke (‘thank you’)</td>
<td>Danke → /dants/</td>
<td>[+ alveolar]</td>
<td>Spontaneous speech</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>/hundeheye/ (‘dog house’)</td>
<td>/hundeheute/</td>
<td>[+ back]</td>
<td>Naming</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Gieskanne (‘watering can’)</td>
<td>/ki:skanja/</td>
<td>[+ back]</td>
<td>Naming</td>
</tr>
<tr>
<td><strong>Phonemes:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intramorphic</td>
<td>4</td>
<td>‘Meine Mutter sitzt im Rollstuhl’ (‘My mother is sitting in a wheelchair’)</td>
<td>Rollstuhl → /ra:rʃtu:l/</td>
<td>[- lateral] or phoneme /r/</td>
<td>Spontaneous speech</td>
</tr>
<tr>
<td>Interitem</td>
<td>5</td>
<td>1) Sitft (‘writing utensil’) + 2) Schlacht (‘battle’)</td>
<td>Schlacht → /ʃlaft/</td>
<td>Phoneme /ʃ/</td>
<td>Repetition</td>
</tr>
<tr>
<td>Interitem</td>
<td>6</td>
<td>1) Fleisch (‘meat’) + 2) Messer (‘knife’)</td>
<td>Messer → /ʃεʃə…/’vεʃə/</td>
<td>Phoneme /ʃ/</td>
<td>Repetition</td>
</tr>
<tr>
<td>Intermorphemic</td>
<td>7</td>
<td>Fleischpreissteigerung (‘increase in meat price’)</td>
<td>Fleischpreissteigerung</td>
<td>[+ frontal] (Labial) or phoneme /b/</td>
<td>Repetition</td>
</tr>
<tr>
<td>Sentential</td>
<td>8</td>
<td>merke ich gar nicht (‘I don’t notice at all’)</td>
<td>gar → ger</td>
<td>[- low ] [-high] or phoneme /e/</td>
<td>Spontaneous speech</td>
</tr>
<tr>
<td>Intersentential</td>
<td>9</td>
<td>Context, i.e. produced text: ‘…als er zu ihr im Fenster geschaut hat’ (‘…when he looked at her in the window’)</td>
<td>Fenster → Finster</td>
<td>[+ high] or phoneme /i/</td>
<td>Picture description</td>
</tr>
</tbody>
</table>
| Intermorphemic | 10 | **Blinde Kuh**  
("Blind man’s bluff") | a) Blinde Blühe then immediately:  
b) Blunde Kuh | a) Consonant group /bl/  
b) Phoneme from a): /u/ | Picture description |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermorphemic</td>
<td>11</td>
<td>/ no smok /</td>
<td>/ no snok /</td>
<td>Phoneme /n/</td>
<td>Spontaneous speech</td>
</tr>
</tbody>
</table>
| Intermorphemic | 12 | Schillingstück  
(‘Schilling piece’ = coin) | /štijštijtkŋ/ | Assimilated phonemes /ng/ → ŋ  
Phoneme /ŋ/ or [ŋ] | Spontaneous speech |
| Sentence level | 13 | Jetzt ein Taucher mit ’n Fisch  
(‘Now a diver with a fish’) | Fisch → Tisch (=‘table’) | Phoneme /t/ | Picture sequence |
| Sentence level | 14 | Priester beten täglich  
(‘Priests pray daily’) | täglich → /tregliː/ | Phoneme /t/ | Repetition |
| Intersentential | 15 | ’Ein Bauer hat einen Esel. Diesen Esel hat er in ein Fell …’  
(‘The farmer (initial phoneme = /b/) has a donkey.  
This donkey he has [put ] in a fur …’) | Fell → Bell | Phoneme /b/ | Retelling a story |
Supplemental material: Stark, “Verbal Perseveration in Aphasia”

<table>
<thead>
<tr>
<th>Intersentential</th>
<th>16</th>
<th>Context: The second boy has hidden himself behind the fence. Produced text: ‘Der Mann nimmt den Buben beim *Flock //beim Spo/beim *Spock- beim Haar Schopf - beim Schopf und das zweite Bub hat sich verst//hat sich ver- hat sich verstopft’ (‘The man takes the boy by the *Flock (= paraphasia) //by the ’Spo’// by the *Spock (=paraphasia) by the hair tuft- by the tuft and the second boy has hi// has hi- has hi- himself – has clogged himself’)</th>
<th>versteckt → verstopft</th>
<th>Vowel /o/ plus affricate /pt/</th>
<th>Picture description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Morphological Level</strong></td>
<td></td>
<td><strong>Derivational morphology:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersentential</td>
<td>17</td>
<td>…. Schnellbremsung (‘emergency braking’) …. ..... Lokomotivführer (= ’engine driver’)</td>
<td>Lokomotivführer → *Lokomotivführung</td>
<td>Morpheme –ung</td>
<td>Retelling a story</td>
</tr>
<tr>
<td>Intersentential</td>
<td>18</td>
<td>… Die Mutter ist entrüstet … *entrêt (‘The mother is *angry . …’ (= erzürnt, ’angry’))</td>
<td>entrüstet → *entzürnt</td>
<td>Unseparable prefix morpheme ent-</td>
<td>Picture description</td>
</tr>
</tbody>
</table>
Supplemental material: Stark, “Verbal Perseveration in Aphasia”

| Intersentential | 19 | Context, i.e. produced text: ‘Es ging so weit gut, bis eines Tages einer der den- die **Mut** hatte den Esel zu das Fell des Esels zu bewachen (= paraphasia for ‘belauern’ (= ’to stalk‘))oder zu *bemuten*’ (‘It went pretty well, until one day one- one who had the- the courage to guard (paraphasia for ‘belauern’ (‘to stalk’) or to *bemuten‘)
| belauern → *bemuten | Morpheme (= word) | Retelling a story |

| Intersentential | 20 | Context, i.e. produced text: ‘Der Bub schaut der schlafenden Katze zu und **er tut was ich nicht mit meiner Katze tut**’ (‘The boy is watching the sleeping cat and he **does what I does not do with my cat**’)
| tuet → tut | third person singular -t | Picture sequence |

| Intersentential | 21 | Context: The boy (=he) Produced text: ‘Die **Tochter** schaut zu und bemerkt aber dann auch wahrscheinlich, dass sie stürzen wird’ (‘The **daughter** is watching and notices then also probably that she (=he) will fall down’)
| er → sie | Genus: +feminine | Cookie Theft picture description (Goodglass & Kaplan (1983)) |

| Intersentential | 22 | Context, i.e. produced text: ‘Und entsetzlich hat die Mutter **geschrieen. Um Gottes Willen ihr habt** Heruntergefallen → herunter**geschrieen**, Participle | Picture description |
das Geschirr heruntergeschmissen und … Den Krug, die Milch und die Teller. Alles ist heruntergeschrieen’ (And terrible the mother has screamed. For God’s sake you have thrown down the dishes and… The jug, the milk, the plates. Everything has screamed down.

<table>
<thead>
<tr>
<th>Interitem</th>
<th>Context:</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>1) Ein kleines rotes <strong>Auto</strong> (+) ('A small red <strong>car</strong>'); 2) Ein großes weiße <strong>Haus</strong> ('A big white <strong>house</strong>')</td>
</tr>
</tbody>
</table>

| Whole word | Story Completion Test (Goodglass et al., 1972) |

<table>
<thead>
<tr>
<th>Interitem</th>
<th>Context:</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>1) Zwetschen<strong>knödel</strong> + ('plum dumplings') 2) Blechlöffel + ('metal spoon') 3) Topfenstrudel + ('cream cheese strudel') 4) Fleischpreissteigerung → Fleischpreis<strong>knödel</strong> ('increase in meat price →'Meat price <strong>dumpling</strong>')</td>
</tr>
</tbody>
</table>

| Whole word, part of compound word | Repetition |

<table>
<thead>
<tr>
<th>Intersentential</th>
<th>Context:</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Das <strong>Eichhörnchen</strong> knabbert ein <strong>Eichhörnchen</strong> (= Nuss) ('The <strong>squirrel</strong> is nibbling on a <strong>squirrel</strong> (= <strong>nut</strong>)</td>
</tr>
</tbody>
</table>

| Whole word | Oral sentence production to a picture stimulus |
### Semantic

| Interitem | 26 | Context:  
1) Er wird arbeiten (He will work) +;  
2) …  
3) **Soldat - Unteroffizier** | **Soldat - Unteroffizier → Arbeiter – Chef** | Semantic feature: relationship between subordinate and superior | Story Completion Test (Goodglass et al., 1972) |
|---|---|---|---|---|---|
| Interitem | 27 | Context:  
1) *Stiefel* (‘boots’) +;  
2) Gans (‘goose’) +.. rote *Stiefel* (red *boots = red *feet (‘*Füße’*) of goose) | rote Füße → rote Stiefel | Semantic feature: having to do with feet | Naming (See text) |
| Interitem / Intertextual | 28 | Context: Picture 1) **Teller** fallen (Plates fall down; Picture 2) … kalte Teller (‘…cold plates’ (= snowballs)) | Schneebälle → kalte Teller | Semantic feature: + round (Plates, snowballs) | Picture description |
| Interitem | 29 | Context:  
1) *Birne* (‘pear’) +  
2) Katze (‘cat’) → *Kapfel* (initial phoneme /k/ + ‘apple’) | Katze → *Kapfel* | Semantic category: fruit  
(Initial phoneme /k/ is correct but the resulting production is a nonword) | Naming |
| Interitem | 30 | Context:  
1) When naming the picture car, the PWA counted the four wheels: ‘1,2, 3, 4’ instead of naming the picture ‘**Auto** (=’car’)  
2) Elefant → **Auto** | Elefant → **Auto** | Associative perseveration: Car: 4 wheels  
Elefant: 4 legs | Naming |
### Syntactic

| Interitem – Form | 31 | Context:  
1) *Trink die Milch!/ Trink sie!*  
→ Trink sie damit du gesund bleibst! + *(Drink the milk!/ Drink it!)*  
→ Drink it so that you stay healthy!  
2) [Stimulus to be completed: ‘A baby has a toy. I take the toy away. What will happen?’]  
Das Baby weint → *Spiele nicht mit dem Spielzeug!* *(The baby cries → Don’t play with the toy!)* | Das Baby weint → *Spiele nicht mit dem Spielzeug!*  
Imperative construction | Story Completion Test *(Goodglass et al., 1972)*  
*(See text)* |
|---|---|---|---|
| Intersentential – Form/Content | 32 | Ich habe *Radio gehört*… Fernsehen gehört *(I have listened to the radio…. listened to TV (= TV schauen(=’watch’)))* | Fernsehen geschaut → *Fernsehen gehört*  
Structure + content | Spontaneous speech |
## Ideational

<p>| Interitem / Intertextual | 33 | Context: The PWA and the clinician had a conversation about the weather and gardening done by the PWA. “Also ein größeres und zwei kleinere ah… also laufen mit und … einen.. einen Krug der dürfte runterfallen und die Blätter sind von den Bäumen heruntergefallen … und das große Mädchen [Th: What fell down?] , Also die Blätter (= Geschirr or Teller (‘dishes or plates’) die uh der den Krug …’ | Geschirr/ Teller → Blätter von den Bäumen | Idea of gardening: leaves and trees; Association triggered by the verb ‘to fall down’ | Picture description: Blind man’s bluff |</p>
<table>
<thead>
<tr>
<th>Interitem/Intertextual</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context:</td>
<td></td>
</tr>
<tr>
<td>1) Picture description: A young man is waving to a woman standing at open window and he trips over a child, who falls down in front of his feet.</td>
<td></td>
</tr>
</tbody>
</table>
| ‘Diese Mädchen oder die Mutter schreit da heraus und sagt, dass das Kind herausgefallen (= paraphasia: hingefallen) ist . . und der läuft daher.  
[Th: Was sagt die Frau?] Frau wird sagen, der Bub ist herausgefallen. |
| 2) Questions after retelling of a story: Child playing on train track, trips and falls down. A train is approaching. The engine driver does an emergency braking and gets off the train and picks up the child and hands it to her mother.  
[Th: Wo liegt das Kind?] ′Vor dem Zug.’  
[Th: Where is the child lying?] ′In front of the train’ +; [Th: How did it get there?] ′It fell out. It fell out of the train.  
[Th: Where was the child playing?] ′On the tracks’. |

1) Ein Kind ist **hingefallen** → **herausgefallen**  
Idea of child falling down Association triggered by the verb ′stürzen’= ′to fall down’  
2) herausgefallen  
2) herausgefallen  
1) Picture description  
2) Retelling of story: Child on the train tracks
| Interitem | 35 | Context:  
1) Uhr + (‘watch’)  
[Th: What time is it?] (12:30) +  
2) Tür (offene Tür) (‘Door (open door’) → Tisch (‘table’) (= paraphasia)  
[Th: What about it? (= door is open)]  
‘Mit dem Tisch. da ist es … 12:30’  
…… (‘With the table. it is 12:30’)  
3) Hase (‘rabbit’) → Eichhörnchen (‘squirrel’) (= semantic paraphasia)  
4) Auto + (‘car’)  
[Th: What color is it?]  
‘It is blue’ +  
5) Flugzeug oder Flieger +  
(‘Airplane or plane)  
‘Aber ich weiss es nicht, wie spät es darauf ist (‘But I do not know what time it is on it’)  
6) 2 Bälle in einem Netz → Balloon –  
(2 balls in a net → ‘balloon’)  
[Th: Where are they?]  
‘Sie sind in einem Flieger.’  
(‘They are in an airplane.’)  
(= Netz (‘net’) (= lexical perseveration)  
Perseveration of the time or of the idea of telling time and also verbal and semantic paraphasias and also lexical perseveration | Naming + Answering questions about pictures |
Supplemental material: Selected Bibliography

Verbal Perseveration: A Selected Bibliography

Jacqueline Stark

Christiane Pons

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The following references deal with perseveration and related phenomena. Although the publications related to aphasia make up the majority of citations, publications that go beyond perseveration in aphasia, namely perseveration in the various forms of dementia, are also included, as well as in other disorders of higher cortical functioning. This bibliography is not complete; rather, it serves as a starting point for a researcher searching for publications relevant for his topic of interest.

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Supplemental material: Selected Bibliography


Supplemental material: Selected Bibliography

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Supplemental material: Selected Bibliography


Supplemental material: Selected Bibliography


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