



Linguistic and emotional-valence characteristics of reading passages for clinical use and research



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1. Introduction

Fluency assessments in people who stutter (PWS) typically rely on reading aloud a text and/or producing spontaneous speech (e.g., Riley, 2008). Reading materials used for fluency assessment are as ubiquitous as they are varied in the stuttering literature, ranging from standard reading passages (e.g. Rainbow passage, Fairbanks, 1960), Newsweek magazine pieces, junior high level texts to scientific papers. Notably, even the American Speech and Hearing Association's (ASHA) presidential address has been utilized (Adams & Hutchinson, 1974; Armson & Stuart, 1998; Duchin & Mysak, 1987; Freeman & Armson, 1998; Hedges, 1982).

This wide assortment of reading materials enriches the assessment process for gauging fluency. However, these materials may differ significantly in the cognitive, emotional, linguistic and speech-motor demands that they place upon the speaker,

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as well as the adequacy of the phonetic sample (Powell, 2006). Indeed, in a systematic factor analysis of 15 reading passages for speech assessment, Powell (2006) found differences in three main dimensions that relate to the readability of the words (lexical complexity), sentences (structural complexity) and the passages as a whole (passage length). Powell (2006) concluded that one must consider the adequacy of the passage for a given clinical population (that may differ in terms of literacy levels, cognitive capacity, production effort/stamina), given the substantial differences in these three dimensions. An examination of the literature reveals that these dimensions have been related to disfluencies. For example, the level of reading difficulty of a passage was associated with the frequency of disfluencies in children (for children who stutter, Blood and Hood, 1978; as well as for children who do not stutter, Cecconi, Hood, & Tucker, 1977). Word familiarity, frequency and length have also been directly related to stuttering, with higher disfluencies noted for unfamiliar and longer utterances for people who do not stutter (e.g., Hubbard and Prins, 1994). Readability and linguistic complexity are not the only factors that may affect reading fluency. In this context, it is important to consider that reading aloud can become an emotional experience related to the content of the words, specifically with respect to their valence and arousal (see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; Dresler, Mériaux, Heekeren & van der Meer, 2009). Negative high-arousal words have been found to slow-down reading, as compared to neutral low-arousal words (see, Algom, Chajut & Lev, 2004; Arntz, Appels & Sieswerda, 2000). These words were also found to disrupt semantic processing (lexical decision task, MacLeod, Tata, & Mathews, 1987), motor-related responses (Chajut, Mama, Levy & Algom, 2010) and even sensory processes (Ben-David, Chajut & Algom, 2012) in comparison to neutral words. Anxiety disorders generally amplify these effects, inflating the attentional bias for such words (Amir, Freshman, & Foa, 2002; Andersson, Westöö, Johansson, & Carlbring, 2006; Chajut, Schupak, & Algom, 2010; Öhman, Flykt, & Esteves, 2001). This notion is of special importance as anxiety has been mentioned as being more prevalent among PWS (Blood, Blood, Bennett, Simpson, & Susman, 1994; Craig, 1990; Fitzgerald, Djurdjic, & Maguinet, 1992; Iverach, Menzies, O'Brian, Packman, & Onslow, 2011; Iverach and Rapee, 2014). PWS typically score higher on both trait anxiety (task-independent anxiety; Alm and Risberg, 2007; Blumgart, Tran, & Craig, 2014; Craig, 1990; Craig & Tran, 2014; Manning and Beck, 2013), state anxiety including task-related anxiety (Blumgart et al., 2014; Davis, Shisca, & Howell, 2007; Lovett, 1988) and social-related anxiety (fear of humiliation and negative assessment in performance based situations; Craig and Tran, 2014; Iverach & Rapee, 2014; Manning and Beck, 2013). How anxiety relates to stuttering has been debated in the literature (Ezrati-Vinacour and Levin, 2004; Menzies, Onslow, and Packman, 1999), with early proponents suggesting a causal role (Sheehan, 1970; Wischner, 1952), but over time, the perspective has changed from anxiety being a mediating factor (Brutten and Shoemaker, 1967; Gregory, 1991; van Riper, 1973) to the more recent view that it is a consequence of being a person who stutters (Craig, 1990; Ezrati-Vinacour & Levin, 2004; Kraaimaat, Vanryckeghem, & Van Dam-Baggen, 2002; Perkins, 1979; Ryan, 1974).

Iverach and Rapee (2014) in their review of the literature stress the need to account for anxiety influences in a fluency assessment procedure. Such a strategy is supported by indications in the literature that word specific threat-related effects are inflated for people with anxiety (Phaf and Kan, 2007; Watts, McKenna, Sharrock, & Trezise, 1986; Williams, Mathews, & MacLeod, 1996; Yiend, 2010) and clinical populations in general (Williams et al., 1996). This highlights that the relation between anxiety and the influence of threat specific words on reading performance is not specific to PWS. In fact, one of the most common tests for performance under threat involves printed threat-related words, also known as the Emotional Stroop paradigm (Algom et al., 2004; Williams et al., 1996). In this paradigm, printed threat and neutral words (e.g., FAILURE and FURNITURE) are presented to participants, and they are asked to respond by either naming their font color, deciding if the string of letters forms a word, or read them out loud (see, Algom et al., 2004). Typically, responses to threat words are slower than to neutral words, and anxiety has been found to inflate this threat effect for color naming as well as for reading aloud (Asmundson and Stein, 1994; Bar-Haim et al., 2007; Rutherford, MacLeod, & Campbell, 2004; Williams et al., 1996; Yiend, 2010).

Several theories have been suggested to explain the threatening effect of the content of words. According to the Threat Theory, the menacing content of the words activates a general-purpose defense mechanism that responds to threat by momentarily freezing all activity that is not directly related to the threat (Algom et al., 2004; Fox, Russo, Bowles, & Dutton, 2001), even at the perceptual level (Ben-David et al., 2012). In the presence of semantic threat-words, the system prioritizes resources for efficient action (Öhman et al., 2001), akin to automatic vigilance (Larsen, Mercer, & Balota, 2006), leaving less resources available for the task at hand (e.g., reading the word aloud). Another theory argues that it is the additional attention that threat words grab that induces this cognitive bias to threat (e.g., Williams et al., 1996). Alternatively, the effect was suggested to be the outcome of both a distraction generated by the threat word and a freeze effect induced by its content (Frings, Englert, Wentura, & Bermeitinger, 2010).

As stated earlier, there is evidence to suggest a close relation between stuttering and anxiety, implying that PWS might show a possible interference when responding to threatening words. Two recent studies have indeed demonstrated reduced performance in the face of threat words with PWS using the emotional Stroop paradigm. Hennessey et al. (Hennessey, Dourado, & Beilby, 2014) found that PWS were slower to respond to threat (than to neutral) words when verbal responding was required. Similar results were obtained by van Lieshout, Ben-David, Lipski, & Namasivayam (2014), where threat words influenced not only latency but also speech production mechanisms in PWS. Taken together, these two studies suggest that automatic responses to the threatening content of printed words (likely exacerbated by the presence of anxiety) tap into the same resource pool (capacity) as the speech motor system (Alm and Risberg, 2007; Craig & Tran, 2014; Neilson and Neilson, 1987). Hence, it may interfere with the ability of PWS to control their speech motor system (Alm and Risberg, 2007; Craig & Tran, 2014; Neilson and Neilson, 1987), given their limitations in speech motor skills (Namasivayam and van

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