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Pristine Inner Experience while Silent Reading:

It's *Not* Silent Speaking of the Text

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Abstract

We used Descriptive Experience Sampling to explore the pristine inner experience of 16 college students while reading Fitzgerald and Hemingway short stories. We provide rich descriptions of the phenomena while reading. Visual imagery was frequent. Although many theorists presume the ubiquitous presence of an inner voice that narrates the text as it is read, we found that only about 3 percent of samples involved such inner narration. Words were experienced during about a quarter of all samples, including: a focus on specific words from the text (but which were not merely inner reading), words innerly spoken in response to the text (content was related to the text but not of the text itself), and innerly spoken unrelated words (apparently not connected to the text). We suggest that presuppositions account for others' over-estimation of silent speech frequency, and discuss the impact of these findings on understanding reading and consciousness science.

Keywords: Pristine inner experience; Silent reading; Inner speaking; Inner speech; Iterative method; Descriptive Experience Sampling; Reading; Phenomenology

Pristine Inner Experience while Silent Reading:

It's *Not* Silent Speaking of the Text

Reading is among the most important human skills in modern societies, intricately linked to education, knowledge, science, economic growth, health, culture, self-esteem, and general happiness (Schwanenflugel & Knapp, 2016). We contribute to the scientific knowledge regarding that skill by exploring the phenomena that naturally occur while reading short stories by Ernest Hemingway and F. Scott Fitzgerald.

There is no dearth of opinion about the nature of experience while reading, including prominently that individuals innerly speak the text being read. For example:

> Nearly if not quite all readers say over again within themselves all that they read. (Huey, 1908/1968, p. 10)

> While reading silently, we often have the subjective experience of inner speech, or a "voice inside our heads." (Filik & Barber, 2011, p. 1)

However, others hold that it is a *heard* (rather than spoken) voice:

> Silent reading…implies the experience of listening to a voice. (Perrone-Bertolotti et al., 2014, p. 227)

> Most of the time we can clearly hear our voice saying the words in the text. (Rayner, Pollatsek, Ashby, & Clifton, 2012, p. 187)

> Despite the longstanding belief that people hear an inner voice while reading…, there is surprisingly little known about the perceptual features of that voice…. It can be argued that a theory of reading comprehension is incomplete without an understanding of the types of auditory images that readers form. (Gunraj & Klin, 2012, p. 137)

We make three observations about such quotations. First, they are all descriptions of pristine experience while reading, where "pristine" means directly apprehended "natural occurrences … unspoiled by the act of observation or reflection" (Hurlburt & Akhter, 2006, p. 272). That is, they characterize phenomena that immediately present themselves while reading as it naturally occurs in everyday situations.

Second, although the phenomenon of speaking is very different from the phenomenon of hearing (consider speaking into a tape recorder and hearing your own voice played back: same voice, same words, same inflection, but unmistakably different phenomena), there is apparently little or no recognition that the above writers describe disparate phenomena.

Third, such characterizations seem to be the result of self-initiated introspection or retrospection. Hurlburt, in Hurlburt & Schwitzgebel, 2007, 2011a, found reason to be skeptical of such introspections.

Gunraj and Klin's (2012) conclusion invites careful explorations of the phenomena while reading, but such explorations are rare. Caracciolo and Hurlburt (2016) described an informal study that randomly probed two individuals as they read Kafka's *The Metamorphosis*, finding

that “Lynn” and “Alex” had very different experiences as they read: Lynn had much visual imagery and no inner speech, whereas Alex had frequent experience of what Caracciolo and Hurlburt called word-word-word, an unexpected (startling to Alex and to Caracciolo) phenomenon where words of the text were experienced as an innerly present (but not spoken or heard) stream of experientially meaningless words, one after another—the experienced words might as well have been Greek.

Like Caracciolo and Hurlburt (2016), the present study applied Descriptive Experience Sampling (DES; Hurlburt, 2011; Hurlburt & Heavey, 2006) but to a larger and more representative sample of readers. DES is well known to readers of this journal (Weisberg, 2011); briefly, it uses a beeper to cue a participant to attempt to apprehend the characteristics of the pristine inner experience that was ongoing at the moment of the beep; within 24 hours, the participant and investigator undertake an “expositional interview” designed to identify and describe the salient characteristics of the at-the-moment-of-the-beep experience. DES attempts to limit retrospection as much as possible, attempts conscientiously to apply rational methods to help both participant and investigator bracket presuppositions about phenomena, and attempts to describe phenomena in high fidelity (Hurlburt, 2011; Hurlburt & Akhter, 2006; Hurlburt & Heavey 2001, 2006, 2015). DES acknowledges that it falls short those aspirations, but the current art has (that we know of) no better way of apprehending pristine phenomena (Hurlburt & Heavey, 2015); for debates see Caracciolo and Hurlburt (2016), Hurlburt (2011), Hurlburt and Schwitzgebel (2007), and all the contributors to Weisberg (2011).

A corollary to the attempt to bracket presuppositions is that investigations of phenomena should be “open-beginninged” (Hurlburt, 2011; Hurlburt & Heavey, 2006). Thus, this study was *not* an investigation of *inner speech* while reading, or of *visual imagery*, or of any other a priori

particularized phenomenon. Instead, we beeped participants as they read short stories in a more-or-less natural situation and attempted to apprehend in high fidelity whatever experience (if any) happened to be ongoing at the moments of those beeps.

To guard against a potential criticism that we had (wittingly or unwittingly) recruited participants who were biased either toward or against inner speech, we randomly selected our DES participants from the upper and lower quartiles of a self-talk questionnaire, thereby ensuring that about half believed themselves to be frequent self-talkers and about half believed themselves to be less frequent self-talkers.

Material and Methods

This study aimed to provide high fidelity descriptions of inner experience while reading short stories from participants who varied on self-reported self-talk. There were three phases: Screening, DES-in-Natural-Environment (training), and DES-While-Reading.

Screening Phase

Participants.

Recruited from the psychology subject pool in a large public university, the 260 participants had mean age = 20.6 years (range 18-49); 28.5 percent were male, 63.5 percent female, 8 percent did not provide gender information; 39% self-identified as white, 17% Hispanic, 15% African American, 15% Asian, 8% Pacific Islander.

Instruments/Apparatus.

The Self-Talk Scale (STS; Brinthaupt, Hein, & Kramer, 2009) uses 16 Likert scales (1 = *never*, 5 = *very often*) to rate the frequency of self-talk in various situations. Total score is between 16 and 80.

Procedure.

We described the study completely to participants in small groups, obtained consent, and administered the STS (and other questionnaires not described here).

DES-in-Natural-Environment Phase

The aim of the DES-in-Natural-Environment phase was to train participants to apprehend in high fidelity their own inner experience, whatever the characteristics of that experience might be. DES holds that a fundamental part of this training is the bracketing of presuppositions and that it is desirable to acquire that bracketing skill removed from any target situation (in our case, apart from reading).

Participants.

We aimed to advance 16 participants from the Screening phase to the DES-in-Natural-Environment phase of the study, 8 from the STS upper quartile ("High-STS") and 8 from the STS lower quartile "Low-STS"). Quartile cutoffs were based on our own participants (upper quartile: STS > 66; lower quartile: STS < 52) resulting in 60 upper-quartile and 59 lower-quartile potential participants. Investigators, blind to STS status, contacted by telephone 25 randomly selected upper-quartile participants and 24 randomly selected lower-quartile participants; 19 agreed to participate; two subsequently dropped out citing time conflicts and one moving out of state. The remaining 16 completed the study, 10 High-STS and 6 Low-STS. Mean age = 20.6 years (range 18-30); 3 male, 13 female; 2 Caucasian, 3 African American, 1 Asian American/Pacific Islander, 3 Hispanic, 3 identified as "Mixed," 4 did not specify.

Instruments/Apparatus.

Beeper: The 4.15 × .85 × 2.40 in beeper typically used in DES studies delivers a 700 Hz tone through an earphone. It beeped randomly (uniformly distributed with minimum of a few seconds, maximum 60 min, average 30 minutes between beeps).

Notebook: 3 × 5 in spiral notebook.

Procedure.

The study and DES procedure were described completely to participants individually; any questions were answered forthrightly and transparently. Consent was obtained both orally and in writing, and was reacquired orally at every step of the procedure.

Descriptive Experience Sampling (DES).

DES followed the procedure described more completely in Hurlburt (2011, in press) and in Hurlburt and Heavey (2006, in press). On each sampling day, the participant carried a beeper into his or her natural, everyday environments and collected six samples of experience. Within 24 hours, the participant returned for an "expositional interview" with multiple investigators (at least two, often as many as five, nearly always including RTH, usually including CLH). The expositional-interview questions were always some form of "What, if anything, was in your experience at the moment of the beep?" with follow-up questions designed to clarify and disambiguate the descriptions and bracket presuppositions. The primary aim of the early expositional interviews was the iterative acquisition of skill in bracketing presuppositions and apprehending and describing inner experience. Throughout the process, the participant was treated as a co-researcher. Within 24 hours of each expositional interview, the investigator team wrote, individually and cooperatively, a contemporaneous description of the experience that had

been ongoing at each beep. The aim of this writing was fidelity, not consensus—the articulation of differing points of view was valued and included in each contemporaneous description.

DES-While-Reading Phase

After completing the four training days of the DES-in-Natural-Environment phase, the participant entered the DES-while-Reading phase, during which the participant was beeped while reading two well-known short stories, "Winter Dreams" by F. Scott Fitzgerald (1922), a modernist romance story, and "Big Two-Hearted River" by Ernest Hemingway (1925), an existential story in a naturalistic setting.

Participants.

The same 16 participants who completed the DES-in-Natural-Environment phase.

Instruments/Apparatus.

Internet app: An online computer program, designed for this study, presented the stories, displayed as a total of 147 "pages" that each contained 10-15 lines of text (approximately 120 words), ending at the conclusion of a paragraph if that was convenient. On six quasi-random pages (23, 39, 82, 99, 124, and 132, three in each story), the program delivered a 700 Hz beep (just like the DES beeper beep except that it terminated after 1.4 sec) via the same earphone used by the beeper. These beeps seemed random to the participant but were in actuality delivered at a fixed number of seconds (ranging from 7 to 14 sec) after the participant had advanced to one of those six quasi-random pages. Participants read at their own pace and required somewhat more than an hour to read the two stories; thus, there was on average approximately 10 minutes between beeps. A screen shot of the computer program presenting the page where the first beep occurred is shown in Figure 1.

Notebook: The same notebook as in the DES-in-Natural-Environment phase.

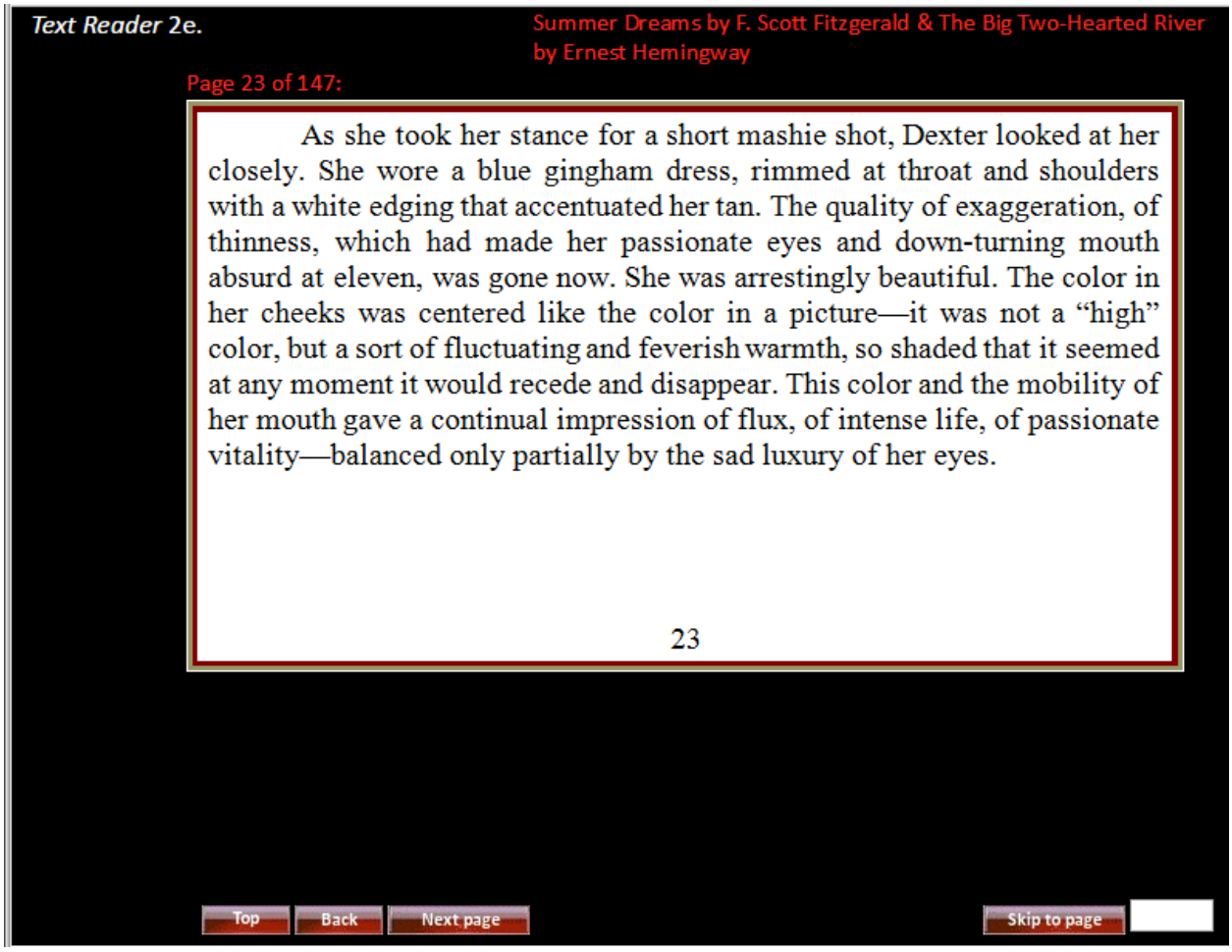

Figure 1
Screen shot of the computer program. The first beep occurred 14 sec after the participant advanced to this page

Procedure.

The procedure was designed to be as similar to the DES-in-Natural-Environment phase as possible; that is, we aimed to simulate participation in a fifth day of natural-environment sampling, except that instead of engaging in their own self-selected natural environment

activities, participants were to plug their DES earphone into their computer (rather than into the beeper) and then read the short stories we supplied for them (over the Internet). Participants engaged in this reading at a time and place of their choosing. Participants read at their own natural pace—that is, they could press the program's *Next page* button whenever they were ready to advance. At each of the six beeps while reading, the participant jotted down notes in the same notebook using the same procedure used in the DES-in-Natural-Environment phase. Within 24 hours of reading, the participant participated in an expositional interview whose procedure, aims, and goals were identical to those used in the DES-in-Natural-Environment phase. After the expositional interview, we asked participants to specify the portion of text they had been reading when each of the DES beeps signaled them.

Contemporaneous descriptions of each sample were prepared using a procedure identical to that used in the DES-in-Natural-Environment phase.

After a participant had completed the study, all the investigators (at least 3, as many as 6) who had been involved in interviewing that participant met to discuss again each sampled experience with the aim of reaching a shared understanding of each sample, identifying where discrepant understandings remained, and then either resolving those discrepancies or leaving the discrepancies explicitly acknowledged as unresolved. Then, typically within 24 hours, each investigator who was present at the meeting wrote an independent brief description of salient characteristics that had emerged throughout the participant's sampling and then coalesced them into a description of the participant's salient characteristics.

Quantification

Once these descriptions of phenomena had been completed, three investigators who had been present for at least some of the interviews independently coded each sample as to the

presence (1) or absence (0) of the five frequently occurring phenomena (dubbed the 5FP by Kühn et al., 2014) found in DES studies: inner speaking (Hurlburt, Heavey, & Kelsey, 2013), inner seeing (Hurlburt, 2011), unsymbolized thinking (Hurlburt & Akhter, 2008), sensory awareness (Hurlburt, Heavey, and Bensaheb, 2009), and feelings (Heavey, Hurlburt, & Lefforge, 2012). These independent codings were then "rectified": any coding discrepancies were announced to all investigators and discussed through tracked changes and/or face-to-face meetings. With respect to inner speaking (the phenomenon of primary interest here), all three coders provided identical codings in 86 of the 93 samples (92%). Of the seven disagreements, the rectification resolved two in the direction of inner speaking and five in the direction of no inner speaking. These five involved either frank mistakes or miscategorizations. For example, one coder scored Harrison 5.5 (described below) as including inner speaking. This was judged to be a miscategorization because the sample involved an inner hearing of a mosquito humming and an innerly seen word ("Humming") but did not involve any speaking phenomena.

On those few occasions where investigators in the group disagreed, or where the investigators agreed that the experience was inadequately apprehended (either by the participant at the moment of the beep or by the investigators in the interview), or where the investigators agreed that the experience was ambiguous or the 5FP category seemed not easily to apply, the sample was coded .5 (regarding inner speaking, this occurred twice: Harrison 5.1 and Caitlin 5.4, both described below).

Results

This study involved 16 participants, 10 in the Self-Talk Scale (STS) upper quartile and 6 in the STS lower quartile.

The DES-while-Reading sampling nominally included 6 samples for each participant (3 while reading Fitzgerald, 3 Hemingway), or 16 × 6 = 96 samples while reading. However, because of equipment malfunction or participant fatigue, one participant obtained four samples, two participants obtained five samples, and one participant had seven samples. As a result, the number of while-reading samples for each participant averaged 5.70 in the upper-quartile group (SD = 0.67) and 6.00 in the lower-quartile group (SD = 0.63), and the total number of while-reading samples was 93: 48 while reading Fitzgerald's "Winter Dreams" and 45 while reading Hemingway's "Big Two-hearted River."

Quantitative

Table 1 shows the percentages of each characteristic, broken down by STS quartile and story being read. The first five pairs of columns show the 5FP; these are directly comparable to other DES studies. The right-hand two pairs of columns show results specific to the present study: the percentage of samples that include words of any kind, and the percentage of samples that were unrelated to the reading. A sampled moment could have more than one simultaneous phenomena (inner speaking and inner seeing, for example, could both be scored 1). Multiple simultaneous instances of the same phenomena (two simultaneous inner seeings, for example) resulted in a score of 1 (not 2). The percentages shown in Table 1 are all unweighted means of the individual participant's percentages. Because, as we have seen, there was a (small) variability in the number of samples each participant contributed, the tabled unweighted means might deviate (slightly) from the overall percentages. For example, for inner seeing, the overall percentage (because there were 53 samples where inner seeing was ongoing) was 100×53/93 = 57.0 percent, whereas the unweighted mean percentage shown in the top row of Table 1 is

Table 1

Inner Experience Phenomena Percentages While Reading, Averaged for Participant, by STS[a] Quartile and by Story

	5FP[b]										Words of any kind[c]		Unrelated to reading	
	Inner Speaking		Inner Seeing		Unsymbolized Thinking		Feeling		Sensory Awareness					
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
All (*n* = 93)	12.9	19.5	56.1	34.8	13.1	15.6	6.4	29.5	25.0	21.1	29.5	26.7	11.5	19.0
STS[a] quartile														
Upper (*n* = 57)	15.8	23.7	51.8	32.6	13.7	16.9	5.0	38.5	25.0	21.2	38.5	28.8	15.0	21.4
Lower (*n* = 36)	7.9	8.7	63.2	40.3	12.1	14.6	8.3	14.6	25.0	23.0	14.6	14.7	5.6	13.6
t (14; upper vs lower)[d]	0.78		-0.62		0.19		-0.53		0.00		1.87		0.96	
p (upper vs. lower)[e]	0.451		0.547		0.853		0.607		1.000		0.082		0.353	
d (upper vs. lower)	0.40		-0.31		0.10		-0.27		0.00		0.97		0.50	
Story														
Fitzgerald (*n* = 48)	19.8	26.7	52.1	40.7	14.3	17.1	7.3	38.0	28.1	32.0	38.0	29.5	12.5	26.9
Hemingway (*n* = 45)	6.8	20.0	60.9	40.9	10.9	19.4	5.2	24.5	20.8	24.0	24.5	35.4	10.4	26.4
t (15; Fitz vs Hem)[f]	2.09		-0.89		0.70		0.37		0.77		1.76		0.22	
p (Fitz vs. Hem)[e]	0.054		0.387		0.494		0.718		0.455		0.098		0.872	
d (Fitz vs. Hem)	0.53		-0.22		0.18		0.09		0.19		0.44		0.06	

[a] STS = Self Talk Scale (Brinthaupt, Hein, & Kramer, 2009)
[b] 5FP = Five Frequent Phenomena (Kühn et al., 2014)
[c] Includes inner speaking
[d] Independent samples
[f] Uncorrected
[f] Dependent samples

56.1%. The discrepancies between overall and unweighted mean percentages are all small; none of the conclusions in this paper depend on the manner in which the percentages are computed.

Recall that the object of the Screening phase was to ensure that we would explore the experience of participants who (by questionnaire self-report) believed they had relatively more inner speech and others who believed they had relatively less inner speech. As expected, this aim was accomplished: STS mean scores for upper-quartile participants differed substantially from the lower-quartile participants (71.40 vs. 42.00, independent-samples $t[14] = 10.62$, $p < .0001$, $d = 5.48$). However, as shown in the middle panel of Table 1, this questionnaire-based division had little if any relation to the inner experience while reading as apprehended by DES and quantified by the 5FP: the smallest *p* value for the 5FP was .45. The percentage of words of any kind did approach significance ($p=.082$), but that is exceptional, so in the results that follow, we collapse STS quartiles and present the results for all 16 participants. A similar conclusion can be reached for the story being read: for the most part we will collapse the Fitzgerald and Hemingway results. Thus for most of our purposes, the top ("All") row of Table 1 is the most important.

Phenomena: Pristine Inner Experience While Reading

We now turn to the main results of interest here: the experiential phenomena that occur while reading the short stories.

Unrelated to the reading.

As shown in the top row, right-hand column of Table 1, participants' mean percentage of samples unrelated to the reading was 11.5 percent. That is, in 11 out of 93 samples, either the participant had broken off reading at the time of the beep or reading continued but the "mind had

wandered." Of these 11, two involved inner speaking, one involved words present not spoken, six involved sensory awareness, five involved unsymbolized thinking, one involved inner seeing, and two did not contain any of the 5FP (the counts do not add up to 11 because some samples contain multiple characteristics). One could argue that we should exclude from all the percentage denominators summarized in Table 1 experiences where the participant had broken off reading, making the denominator of an overall percentage 82 instead of 93. We have not done so because the determination of what constitutes "unrelated" is somewhat slippery; here again, the ramifications are all small (the percentages in Table 1 would be multiplied by a factor of approximately 1.13), and none of the conclusions in this paper depend on the manner in which the percentages are computed.

We will work our way across the remainder of the top row of Table 1, beginning with the largest value.

Visual Imagery.

As shown in the top row of Table 1, by far the predominant characteristic of inner experience while reading was inner seeing (sometimes called visual imagery or seeing images). Participants experienced inner seeing in 56.1 percent of their while-reading samples. Here is one typical example (all participant names are pseudonyms; "Harrison 5.4" refers to the fourth sample on Harrison's fifth sampling day; information inside square brackets is provided to contextualize the experience but is not part of the participant's inner experience that was ongoing at the moment of the beep):

> Harrison 5.4: [Harrison is reading Hemingway's "Big Two-Hearted River," a scene where the main character, Nick, is lying in the shade of a pine tree looking up through the

> branches at the sky.] Harrison is innerly seeing a pine tree as if he were lying on his back underneath the branches, looking up. The branches, the dark green of the needles, and the light blue of the daytime sky are part of his experience, but the most salient aspect is the tree. This is a first-person inner seeing. That is to say, it is not just a view of the tree from underneath the branches; it is as if Harrison experiences himself under the tree seeing upwards.

We intend in a subsequent paper to describe and provide examples of the various kinds of inner seeing phenomena. This open-beginninged study examined the inner-seeing samples with the same care and differentiation as will be described for inner words in the next section, but space constraints require that this paper focus on only one main set of phenomena, here the various kinds of inner word phenomena.

Words While Reading.

As shown in the top row, second-from-right pair of columns of Table 1, participants' mean percentage of samples where some form of words were experienced while reading was 29.5 percent. Participants experienced words while reading in 25 of their 93 while-reading samples. We identified five distinct word-related phenomena that occurred while reading; each is discussed below but summarized here: (1) One sample included a silent speaking of the text; (2) Two samples involved silent hearing of the text; (3) Fifteen samples involved a focus on a specific word or words from the text but were not a simple inner reading of the text; (4) Four samples involved words in response to the text—content that was related to the text but not of the text itself; (5) Three samples involved words seemingly unrelated to the text.

Silent speaking of the text.

In one instance (1.1% of 93 reading samples or 4% of the 25 reading samples where words occurred), the participant was innerly speaking the text being read. That is, only one of our 16 participants had any instances of silent speaking of the text while reading our short stories. Here is the instance:

> Caitlin 5.3: [Caitlin is reading Fitzgerald's "Winter Dreams."] At the moment of the beep, Caitlin is cognitively anticipating, trying in some cognitive (non-visual, non-worded) way to imagine what Dexter is laughing at, which is about 60% of her experience. Simultaneously, Caitlin is innerly saying the sentence as she reads it; at the moment of the beep she is saying "he was laughing" in her own voice; this saying occupies about 40% of her experience.

Silent hearing of the text.

Because the phenomenon of hearing is very different from the phenomenon of speaking, DES separates the phenomenon of inner hearing from that of inner speaking. In two samples (2.2% of 93 reading samples or 8% of the 25 reading samples where words occurred), both from participant Maddi, the participant was innerly hearing the text being read. For example:

> Maddi 5.2: [Maddi is reading the "Winter Dreams" sentence, "'I'm afraid I'm boring you,' he responded quickly."] At the moment of the beep, Maddi is innerly hearing herself reading "I'm afraid"; her sense was that she would have heard the remainder of the sentence had she not been interrupted by the beep. The reading is heard in her own

natural voice. [She was reading with comprehension, although that aspect was not in experience.]

Maddi's second such example (sample 5.4) was very similar, hearing "Sharp at the edge," the beginning of the "Big Two-Hearted River" sentence "Sharp at the edge of this extension of the forest floor commenced the sweet fern." In both instances, Maddi heard her own voice, in a natural tone, speaking words written in the story. That is, the characteristics of the hearing did not depend on whether the written text was directly quoted dialog (sample 5.2) or description (sample 5.4); in both instances the hearing was of her own voice, not that of the story's character.

Focus on specific word or words from the text that were not simple reading.

In 13 instances (14.0% of 93 reading samples or 52% of the 25 reading samples where words occurred), the participant experienced a particular word or words from the text, but these experienced words were not simply a part of a silent speaking of the text. Three of these involved a temporal and/or otherwise separation of pieces of the text. For example:

Caitlin 5.5 [Caitlin is reading "The swamp was perfectly quiet" in "Big Two-hearted River."] At the moment of the beep, Caitlin is innerly seeing a dark, quiet swamp in the distance, including a small body of water and trees. The inner seeing is not detailed and is about 60% of her experience. Simultaneously, the word "quiet" and the words "the swamp was perfectly" are both simultaneously present to her but in two distinctly different ways. "Quiet" is more prominent, experienced as probably spoken or perhaps both spoken and heard. The words "the swamp was perfectly" are somehow "on her

mind," somehow actively / purposefully / specifically being kept alive in memory—she is holding on to the words— as she processes the remainder of the sentence. [That is, this keeping-in-mind is *not* merely that the words are in short-term memory, but rather that she experiences herself as specifically involved in intentionally keeping those words in memory. It was not clear how those words were experienced: perhaps spoken, perhaps heard, perhaps both, perhaps some other way that was difficult to describe.]

Caitlin 5.6: [Caitlin is reading "…into the fast water" in "Big Two-hearted River."] At the moment of the beep, "water" and "into the fast" are experienced in two different ways. She is innerly saying/hearing "water" in her own inner voice. Simultaneously, the words "into the fast" are lingering, apparently in her voice as she is actively, purposely keeping these words in her experience [apparently the same kind of doing-of-keeping-in-mind phenomenon described in her sample 5.5]. The inner speaking of "water" is about 70% of her experience. Caitlin is also innerly seeing river water flowing towards her. She sees the flowing water without riverbanks, etc. She sees her (right) hand in the water so that the flowing water is hitting the back of her fingers.

Harrison 5.1: [Harrison is reading "Winter Dreams" with comprehension, but this was apparently happening outside of awareness.] At the moment of the beep, he is innerly seeing a woman's face from the cheekbones up, specifically the eyes, forehead, cheeks, and hair. The eyes are brown and are experienced to be perhaps 25 percent larger than they would actually be. The hair is brown and done without bangs. [After the beep Harrison described the face as being that of his girlfriend, but the girlfriend-ness was not part of his experience at the moment of the beep.] The eyes are the most salient portion of

> the inner seeing. Also in his experience are the words "passionate eyes," present in an "inner auditory" manner [Harrison was not sure if they were innerly spoken or innerly heard]. The words have a "lingering" quality as if they were "hanging around" from a moment before. That is, the words "passionate eyes" were in the middle of a sentence that he had already read to the end, but those two words experientially continued while the reading progressed and the inner seeing took place. [Of the total experience Harrison described the face as being 90% of the experience and the words as 10%.]

Those examples describe text words that were innerly spoken or heard, but this phenomenon is very different from simply "silently speaking the text" as that phrase is typically intended. Caitlin had, for whatever reason, experientially broken apart the read text and experienced words as existing in two different ways. Both Caitlin and Harrison had extended the words from where they might naturally have occurred had there been a simple silent articulation of the text. Note that neither had broken off from reading to engage in this experience—this is apparently the way their experience occurs while reading is ongoing.

In three samples, the reader was somehow engaged with a read word in a manner that is not part of the story's meaning. For example:

> Felicity 5.0A: [Felicity had just read a "Winter Dreams" sentence that included the word "Mortimer," which she had innerly said in the midst of reading. The rest of the sentence had not been innerly said.] Now, at the moment of the beep, Felicity is sensing a stabbing pain in a localized region on the surface of the front, middle, upper portion of her left

thigh. She is also experientially disliking the word “Mortimer”—the word is ugly or negative. The disliking is experienced more as mental than as physical or emotional.

Nina 5.1: [Nina, whose last name is Mendoza, had just read a “Winter Dreams” sentence about the character Judy Jones.] At the moment of the beep, Nina is innerly saying “Judy Jones Nina Mendoza Judy Jones Nina Mendoza” repeatedly at a slightly fast pace. She is innerly hearing the way these names sound. [She is somehow comparing the sounds of her own and the character’s names and likes the way these names sound, but these aspects were not directly in her experience at the beep.]

Pamela 5.1: At the moment of the beep, Pamela is innerly speaking 3-4 repetitions of the word “gingham” in different ways. [She is not familiar with the word “gingham,” and is apparently trying to figure it out.] The beep catches her somewhere in the middle of the repetition when she is saying something like “ging ham.” The words are spoken in her own voice. [Pamela’s experience had lost contact with the reading task at this moment.]

In these cases, the reader was innerly speaking words of the text, but these are not actually silent speakings of the text—the readers’ experience involved some characteristic of the word itself, not related to the ongoing story.

In two examples, there was an experienced distortion of a characteristic of the words:

Isobel 5.1A: [Isobel is reading the "Winter Dreams" description of Mr. Hart winking at Dexter.] At the moment of the beep, she is innerly seeing Mr. Hart's face with an eye winking. The eye is the most prominent part of the face and the rest of the face is indistinct. At the same time, Isobel is looking at the text that reads "swifter ball," which she sees as one word, "swifterball," even though the actually presented words have a space between them. She may have been wondering what "swifterball" means. [Whether the wondering was actually experienced at the moment of the beep we were not sure.]

Harrison 5.5: [Harrison is reading the "Big Two-Hearted River" passage that mentions the humming of a mosquito.] At the moment of the beep, Harrison is innerly hearing the loud humming of a mosquito near his right ear. This loud humming occupies almost all of Harrison's experience, perhaps 95%. Harrison is also simultaneously innerly seeing the word "Humming," seen in something like Times New Roman font, similar to what was presented in the computer display, although the innerly seen word was capitalized ("Humming") whereas the actual read word had been all lower case. The innerly seen word was also somewhat larger than the actually read word "humming." [This inner seeing is not prominent in his experience, perhaps only about 5%.]

In one example, the reader seemed to be using the word as part of a visualization process:

Isobel 5.2: [Isobel is reading "Winter Dreams."] At the moment of the beep, she is seeing the words "terrible afternoon" and is simultaneously feeling her thumb as it is dug into by

the fingernail on her left middle finger. At the same time, she is hearing herself say, in her own voice with a quizzical inflection, "terrible [which she pronounced something like "treble"] afternoon." She is actively, intentionally trying to create a mental seeing that somehow conveyed "terrible/treble afternoon." [So far, she had not been successful in creating this seeing; that is, she was waiting for a seeing of "treble afternoon" to come.]

There were four examples where the reader was in some way focused on a word or short phrase, and where this focus was not experienced as being part of the reading or part of a sentence. Here are two examples:

Adele 5.4: [Adele is reading "Big Two-Hearted River" and is seeing the word "rested" on the screen]. She is simply seeing "rested"; nothing else is in her experience.

Jenni 5.5: [Jenni had noticed the word "mosquito" and was connecting mosquito bites to feeling itchy. Reading was not ongoing at this time.] At the moment of the beep, the word "mosquito" is present in Jenni's experience, but is not spoken, heard, or seen. Also at the moment of the beep, Jenni is feeling itchy on the lower calf of her right leg. There is no specific size or shape to the itchiness, no specific quality (it is not a mosquito-bite itch), and it is a general itchiness, not particularly located on or under the skin.

Words in response to the text.

In four instances (4.3% of 93 reading samples or 16% of the 25 reading samples where words occurred), words were experientially present that were in response to, but not directly

reflective of, the text. In three of these, all from the same participant, these responses were innerly spoken. For example:

> Barbara 5.1: [Barbara is reading with comprehension the "Winter Dreams" passage "The quality of exaggeration, of thinness, which had made her passionate eyes and down-turning mouth absurd at eleven, was gone now. She was arrestingly beautiful." However, at the moment of the beep, that passage itself is *not* in her experience. Instead,] Barbara is innerly saying, "Awww, he likes her," in her own voice with a sweetly sentimental tone.

> Barbara 5.3: [A few seconds before the beep, Barbara had read a "Winter Dreams" passage about Judy moving away.] At the moment of the beep, Barbara is innerly saying, "Why did you leave in the first place?" in her own voice in a blaming tone. Simultaneously, Barbara is experiencing something bodily that is similar to this tone—more or less like rolling her eyes—but it was not clear exactly how she experiences this.

These speakings are self-generated sentences; no portion of "Awww, he likes her" or "Why did you leave in the first place?" actually appear in the reading itself. Rather, they are a comment on action in the story.

In one instance, the participant generated a novel phrase in response to the reading. However, in this case, the words were merely present, not innerly spoken:

> Jenni 5.2: [Jenni is reading "Winter Dreams," where Dexter was talking about having been kissed by Judy. Reading is on-going with comprehension but was not in experience.] At the moment of the beep, Jenni is wondering why Dexter wants to kiss Judy. There are words present in Jenni's experience, which might be "why would he want to kiss her" or "why did he want to kiss her." These words are not spoken, heard, or seen, but Jenni was confident that specific words were present, even though she could not be confident about some of the details of those words (such as whether the word was "would" or "did"). Also at the moment of the beep, Jenni is feeling irritated; this is a mental feeling that she feels in her head. The thinking about the kissing and the feeling are equally present in experience.

Words unrelated to the text.

In three instances (3.2% of 93 reading samples, or 12% of the 25 reading samples where words occurred, or 27.3% of the 11 samples unrelated to the reading) there was ongoing inner speaking that was unrelated to the reading. In those instances, the participants had no experience of the reading task (whether some sort of reading process was ongoing is not known). For example:

> Barbara 5.5: [Barbara's eyes are pointed at the screen, but the story is not present in her experience in any way.] At the moment of the beep, Barbara is innerly saying to herself, "I need to ask my boss if I can leave early," in her own voice with a flat tone.

In one instance, there were words experienced as ongoing that were not innerly spoken:

Emma 5.4: [Emma's leg had started to shake.] At the moment of the beep, the sequence of words "my leg started shaking" is present, but it is not clearly spoken, even though the words are clearly present in some way. Also present is the content *right this moment* and *quickly* (referring to the shaking leg), but these are not experienced as words or in any other symbols—they are a cognitive or unsymbolized extension or amplification of the words that are present. Also present in her experience is the sensation of her leg shaking up and down quickly. [She described her experience as 50% feeling her leg's shaking and 50% the thoughty observation.]

Sensory Awareness. As shown in the top row, fifth pair of columns of Table 1, participants' mean percentage of samples involving sensory awareness was 25.0 percent. That is, there were 24.5 instances where the participant's experience included sensory awareness, "the individual's being immersed in the experience of a particular sensory aspect of his or her external or internal environment without particular regard for the instrumental aim or perceptually complete objectness" (Hurlburt, Heavey, & Bensaheb, 2009, p. 232). Here is a typical example in which the participant experienced a sensory aspect of an element imagined from the story:

Emma 5.5: [Emma was reading the words "and the match went out".] At the moment of the beep, she is innerly seeing the orangey-red candle-lit glow of the inside of a cabin with a man sitting on a bed. Emma's experience is mostly focused on the orangey red light of the scene and the feeling that it evoked. This positive/romantic feeling is attached

> to and not separate from the orangey red color—as if the orangey-red-candle-glow is the feeling or is inseparable from the feeling. The man is not very detailed and is not Nick from the story, but is just a man. [That is, Emma was innerly seeing a scene that was related to the reading but was not directly illustrative of the reading—she saw a man (not recognized to be Nick) in a candlelit room, not Nick with a match.]

In some instances, the sensory awareness that was ongoing while the participant was reading related to a sensation in the real world. For example, Jenni's leg itchiness (described above at sample 5.5) was a real-world sensory awareness experience that was congruent with an element from the narrative (the mosquito).

Unsymbolized thinking. As shown in the top row, third pair of columns of Table 1, participants' mean percentage of samples involving unsymbolized thinking was 13.1 percent. That is, there were 12.5 instances where the participant's experience included unsymbolized thinking, "the experience of an explicit, differentiated thought that does not include the experience of words, images, or any other symbols" (Hurlburt & Akhter, 2008, p. 1364). For example:

> Olivia 5.3: At the moment of the beep, Olivia is considering how the title of the story ["Winter Dreams"] ties into the story; this involves an inner seeing and an analytical component that compares the winter weather to the cold nature of the woman. Olivia is innerly seeing a snow-covered golf course at night, which involves pine trees and open hills. The seeing is tinted blue [which Olivia explained was not unusual, just her

description of night lighting] and in the point of view of the character standing on the golf course. The analytical component involves a complex cognition, including mentally comparing/contrasting the female character to the winter scene, which involves themes of coldness, that the woman is emotionally cold, but that the woman is also seen positively, so Olivia is trying to recall a positive element to the winter scene, and also wondering if she has missed any other similarity. [Olivia was no longer actively reading, and she was not sure if her eyes were still tracking the text.]

Inner speaking. As shown in the top row, first pair of columns of Table 1, participants' mean percentage of samples involving inner speaking was 12.9 percent. There were 11 samples confidently coded as inner speaking and 2 samples (coded as .5) in which it was unclear whether the experience qualified as inner speaking. Thus, in approximately 12 instances (12.9% of 93 samples, or 48% of the samples where words occurred), the participant was innerly speaking at the moment of the beep. We have described seven of the confident examples (Caitlin 5.3, Caitlin 5.6, Nina 5.1, Pamela 5.1, Barbara 5.1, Barbara 5.3, and Barbara 5.5) and both unconfident samples (Caitlin 5.5 and Harrison 5.1) above. In only one of the 12 instances (Caitlin 5.3) was the participant innerly speaking the text as read. Inner speaking other than innerly speaking the text as read involved speaking in response to the text (e.g., Barbara 5.1: "Awww, he likes her"); speaking unrelated to the text (e.g., Barbara 5.5: "I need to ask my boss if I can leave early"); or a focus on specific word or words from the text that were not simple reading (e.g., Caitlin 5.6: "water" and "into the fast" are experienced in two different ways).

Feelings. As shown in the top row, fourth pair of columns of Table 1, participants' mean percentage of samples involving feelings was 6.4 percent. That is, there were 6 instances where the participant's experience included feelings, the experiential aspect of emotion (Heavey, Hurlburt & Lefforge, 2012). Feelings were generally reflective of the ongoing story content. For example:

> Jenni 5.3: [Reading was on-going with comprehension, but the reading was not in experience.] At the moment of the beep, Jenni is feeling mildly sad along with Dexter [whose girlfriend had left him]; this is a mental feeling that she felt in her head and is directly related to the plot of the story.

The Story

Participants read two stories, Fitzgerald's "Winter Dreams" and Hemingway's "Big Two-hearted River." The bottom panel of Table 1 shows the participants' unweighted average percentages broken down by story. There was, perhaps, somewhat more inner speaking while reading the Fitzgerald story than while reading Hemingway (19.8% vs. 6.8%, dependent-samples $t(15) = 2.09$, $p = .054$), and somewhat more words of any kind present during Fitzgerald than Hemingway (38.0% vs. 24.5%, $t(15) = 1.76$, $p = .098$). The remaining 5FP phenomena do not approach significance.

Discussion

The main aim of this paper is to glimpse and describe, with as high fidelity as the state of the art allows, the naturally ongoing ("pristine") inner experience that spontaneously occurs during everyday reading. We found that innerly seeing imagery closely or loosely related to the

story was common (we will say more about that in a separate paper). We found that inner words were present in 29.5 percent of our samples; we have provided careful descriptions of such words above, and focus our discussion on this experience of inner words while reading.

Perhaps our most startling finding was that *we found only three instances (3% of 93 samples) where the text was directly experienced as spoken or heard while reading.* Our results are in stark contrast with other researchers' estimates, which typically range from 53% (Moore, 2016) to an assumption of close to 100% (Filik & Barber, 2011; Perrone-Bertolotti et al., 2014). We consider four possible explanations of this huge discrepancy.

(1) The participants in the present study might have been unusual. This study took pains to minimize this possibility: we selected participants randomly from a large stratified pool, and our stratification was based on self-reported self-talk frequency. Our sample thus included self-reported higher-frequency and lower-frequency self-talkers, but participants in neither group silently spoke or heard the text being read. It seems unlikely that we had somehow selected just those readers who did *not* typically innerly speak the text.

(2) Perhaps the Fitzgerald and Hemingway stories, or the sampled moments within them, just happen to be of the kind that do *not* invite innerly speaking the text. Hardyck and Petrinovich's (1970) electromyographic study suggested that light reading may not involve inner speech. However, Moore's (2016) large-sample studies found that type of reading content (novel, play, poetry, abstract philosophy) did not appreciably alter inner voice frequency. It therefore seems unlikely that the reading selection was itself responsible for our low frequency of innerly-spoken text.

We note that even if (1) or (2) is correct, then this study undermines the widespread opinion that innerly speaking the text is ubiquitous; accepting (1) or (2) would indicate that at

least *some* reading by *some* people is performed without innerly speaking the text; further research would then be required.

(3) Our study may have systematically discouraged participants from reporting inner speech. However, the DES apprehension of inner speech is done with high reliability (Hurlburt & Heavey, 2002) and incorporates many strategies for high fidelity apprehensions and descriptions (Hurlburt, 2011). DES takes extraordinary care to apprehend and describe each individual sample in high fidelity. Furthermore, 29.5 percent of our while-reading samples involved the inner experience of some sort of words—they simply were not innerly speaking the words of the text. Furthermore, our participants often expressed surprise (or astonishment) that they had been reading with comprehension without speaking the words, something they themselves believed to be impossible. We think it unlikely that our participants overlooked actually ongoing inner speaking of the text.

Some might hold that the inner speech while reading is compressed and therefore not recognized by DES. We have argued against that position (Hurlburt & Heavey, 2015), but if true, then the contribution of this paper is that characterizations such as "Most of the time we can *clearly hear* our voice saying the words in the text" (Rayner, Pollatsek, Ashby, & Clifton, 2012, p. 187; emphasis added) should be recognized as substantially misleading. Some might hold that because the reading experience is predominately visual, the inner vocal aspects have disappeared from memory before the DES interview would get to them. We have argued against that position (Hurlburt, 2011). It is beyond the scope of this paper to address all such methodological issues, but there are extensive discussions in Caracciolo & Hurlburt, 2016; Hurlburt, 2011; Hurlburt & Heavey 2001, 2006, 2015; Hurlburt & Schwitzgebel, 2007; Weisberg, 2011, and all the contributors to his special issue. We accept as defensible the position that explorations of

inner experience are too fraught to be of value to science and therefore that DES findings should not be accepted. We disagree, but we think that if science is to adopt that view, *no* descriptions of inner experience should be accepted unless one has used and defended an experiential methodology superior to DES, in which case the contribution of the present paper would be to discourage scientists from beginning their papers with sentences such as "Most people hear a little voice inside their head when thinking, reading, writing, and remembering" (Oppenheim & Dell, 2008, p. 529).

(4) Perhaps others have dramatically overestimated the frequency of silently speaking the read text. Elsewhere (Hurlburt, Heavey, & Kelsey, 2013) we have noted that presuppositions about the ubiquity of inner speech abound (e.g., "Human beings talk to themselves every moment of the waking day"; Baars, 2003, p. 106), whereas the DES natural-environment sampling shows the inner speaking frequency is about 25 percent. No other studies of reading attempt to bracket presuppositions about inner speech, and such failure can lead to substantial misrepresentation of inner experience characteristics (Hurlburt & Heavey, 2015). We have argued elsewhere about the pervasive and pernicious character of presuppositions (Hurlburt, 2011; Hurlburt & Schwitzgebel, 2007, 2011a), and the particularly problematic characteristics of self-initiated introspection (Hurlburt & Schwitzgebel, 2011b). If one asks, *What is my experience while reading?* and then self-initiates reading-while-simultaneously-characterizing-my-experience, that overlaid reading/characterization task is very likely to involve experienced words even though natural reading does not.

The present study did not begin with the presupposition that inner speech while reading is rare. We would have been just as happy to have found 100 percent inner speaking of the text; our contribution then would have been to describe the characteristics of innerly spoken text: own

voice or other's? Voice of the text's character? Inflected or monotone? Fast or slow? Condensed or complete? Our method sought to be even-handed with respect to inner speaking.

We believe that (4) is correct: science *does* dramatically overestimate the incidence of inner speaking while reading.

Conclusion

Our results provide an unusually rich glimpse into the (largely unknown) naturally occurring experiential phenomena while reading. Our results suggest that words are not frequent features of the pristine inner experience while reading classical short stories, occurring in less than a third all our samples; that when words are present while reading, they are often *not* the words of the text (reading, with or without comprehension, may involve the experience of words that are entirely different from those present in the text); and that when the text's words are experientially present, they are not prominent but rather usually a relatively minor aspect of a complex and multi-layered experience.

Most of these phenomena we have described above are not widely (if at all) discussed in the literature. Recalling Gunraj and Klin's view that any "theory of reading comprehension is incomplete without an understanding of the types of auditory images that readers form" (2012, p. 137), exploration of this phenomenology would be a large contribution to the theory of reading. We have gone to extraordinary lengths to provide high fidelity glimpses into experiential phenomena while reading, but it is of course possible that we are mistaken—we encourage replication by others. If we are not mistaken, these results raise important questions about reading: Does the lack of innerly read text apply to other forms of reading? To which readers? In which languages? In which stages of development? What is the relationship between the actual

phenomena while reading to reading comprehension? To reading pedagogy? Does pristine experience matter? For what? Clearly there is much work to be done.

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