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Using a Thought Listing Procedure to Construct the General Inner Speech Questionnaire: An Ecological Approach

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The construction of existing self-report measures of inner speech is guided by a priori theoretical views regarding how it is experienced or what functions it serves. We present two studies aimed at constructing and validating a more ecologically valid tool called the General Inner Speech Questionnaire (GISQ). Study 1 employed an open-format thought-listing procedure inviting 227 participants to freely recall what they talk to themselves about in general. The most frequently self-generated inner speech instances were about negative emotions, problem solving/thinking, planning, self-motivating, emotional control, and self. In Study 2, we used this inner speech content to construct the 57-item GISQ. The GISQ is normally distributed, shows acceptable internal consistency, and contains four moderately strong factors: self-reflection, self-observation, cognition, and inner speech accompanying activities. Importantly, the GISQ correlates positively with other measures of inner speech and self-related processes.

INTRODUCTION

Measuring inner speech, which constitutes the activity of talking to oneself in silence (Alderson-Day & Fernyhough, 2015), represents a major challenge fraught with numerous difficulties and pitfalls. All existing techniques assessing speech-for-self present serious limitations. To illustrate, although articulatory suppression informs us on specific functional deficits caused by blocking inner speech (e.g., self-control; Tullett & Inzlicht, 2010), and electromyographic recordings of tongue movements allow frequency estimations of inner speech production during completion of cognitive tasks (e.g., calculating; Sokolov, 1972), these two techniques do not provide access to inner speech *content* per se (i.e., topics people regularly talk to themselves about).

Thought sampling approaches such as the Descriptive Experience Sampling (DES; Hurlburt, 2011) have trained participants randomly interrupted in their everyday life using some electronic beeper. They are then asked to report their inner experiences (including inner speech) right at the moment of being cued to do so. Such studies do capture some content (and functions) of inner speech, but they usually do not systematically code nor report them; when they do, rather simplistic a priori created categories are used—e.g., inner speech about

leisure, chores, work (D'Argembeau et al., 2011). One approach within sports psychology consists in audio-recording spontaneous private speech emitted by athletes during sporting events (e.g., Van Raalte, Cornelius, Copeskey, & Brewer, 2014). In such studies, private speech is simply coded as motivational, instructional, positive, negative, and irrelevant.

Several self-report questionnaires using Likert-scales have been designed to assess inner speech's key functions and content, including the Varieties of Inner Speech Questionnaire (VISQ, McCarthy-Jones & Fernyhough, 2011) and the Self-Talk Scale (STS; Brinthaupt, Hein, & Kramer, 2009). The VISQ taps into phenomenological qualities of inner speech, such as dialogicality and condensed/expanded. The STS comprises four subscales measuring self-regulatory aspects of inner speech, such as social assessment, self-criticism, and self-reinforcement. These two, as well as other scales, exhibit acceptable reliability but poor validity (Uttl, Morin, & Hamper, 2011), suggesting that they measure different subconstructs somehow related to inner speech. Importantly, they motivate participants into endorsing preexisting content and functions based on potentially biased views of inner speech. For example, the STS uniquely assesses the self-regulatory function of inner speech, leaving out several other important functions such as working memory, task switching, self-reflection, theory-of-mind, and language production and comprehension (for more inner speech functions, see Morin, 2012).

In summary, no currently existing questionnaire measures inner speech in a broad sense (i.e., including more potential functions and content as opposed to one single dimension) or is based on what people actually report talking to themselves about in their everyday lives. Here we describe the steps we followed to construct and preliminarily validate the General Inner Speech Questionnaire (GISQ), a much more encompassing—and, we hope, more ecologically sound—self-report instrument.

In a 2018 study, Morin and colleagues adapted a thought listing approach, usually used to assess inner speech emitted in specific situations (e.g., anxiety experienced during social interactions; Cacioppo & Petty, 1981) to probe self-reported inner speech use in general in 76 participants. Our goal thus was to further investigate the content of naturally occurring inner speech in everyday life. One strength of this approach is its open-ended format, which encourages participants to list self-generated instances of inner speech. One important limitation is its retrospective nature, causing possible mnemonic biases. Results obtained in our 2018 study allowed us to list the most frequent inner speech topics participants reported talking to themselves about. We used this content to construct the GISQ presented in Study 2. Study 1 aimed at replicating our 2018 results and presents data pertaining to the self-reported frequency of content and functions of inner speech occurring in everyday life in a larger sample of 227 university students. Study 2 describes the steps taken to build our new measure based on results reported in our 2018 article and replicated in Study 1, and also offers preliminary validation analyses of the GISQ.

STUDY 1

Methods

Participants and Testing

Two hundred and twenty-seven consenting students (180 females and 47 males, with an average age of 21.1; $SD = 5.1$) from a small Canadian university were granted course credits

for taking part in this ethics-approved study. Participants were assessed in a classroom setting and were administered a package containing a consent form, demographics (age and gender), the open-format inner speech form, and some other self-related questionnaires used in Study 2 as well as other concurrent studies, and a debriefing form. Overall, testing took approximately 60 minutes, but completion of the inner speech listing self-report form itself took between five and 10 minutes.

Self-Reported Inner Speech Measure

The inner speech thought-listing form used in Study 1 instructed volunteers to recall talking to themselves in general over the past six months by providing up to 48 examples of self-talk instances. They were invited to complete Block 1 first ("I talk to myself when"), then Block 2 ("I talk to myself about"), and then Block 3 ("I talk to myself in order to"), using as few words as possible in each box (for full instructions, see Morin, Duhnych, & Racy, 2018). The instructions and the 48 inner speech instance boxes filled in by hand all fit one sheet of paper. An "instance" was defined as a single inner speech topic associated with a code in our coding scheme developed in previous studies (e.g., Morin, Uttl, & Hamper, 2011; Morin et al., 2018; Uttl, Morin, Faulds, Hall, & Wilson, 2012). Consequently, although each open-format inner speech sheet was made up of 48 boxes, a sheet would usually contain more than 48 instances. For example, a participant could write "make-up" in one box (= 1 inner speech instance coded as "physical appearance"), or "make-up for party" (= 2 instances coded as "physical appearance" and "social situations"). The open-format self-report form also asked volunteers, "How confident are you that what you remembered about what you talked to yourself about is accurate?" on a 5-point Likert-scale ranging from 1 (not confident) to 5 (very confident).

Coding System

All inner speech instances were coded by the third coauthor using the following classification system: (a) general content (32 topics), (b) people (16 topics), (c) environment (8 topics), (d) functions (25 topics), (e) activities (21 topics), and (f) temporal events (3 topics; see Figure 1 and Table 1 for details). A thorough description of this system and how it was developed can be found in Morin and colleagues (2018).

Results

Coding Reliability

A random selection of 25% of all 227 self-reported inner speech forms ($n = 57$; 1465 inner speech instances) was coded by a second independent rater. There was a good percentage agreement of .80 between the two raters. Coders identified and recorded "unclassified" and "not inner speech" instances not captured by the previously used 2018 coding scheme. The first two coauthors reviewed these instances, created some new topics in the coding manual, and were able to code 187 out of 295 (63%) originally noncoded instances. This revised coding system was used for all results reported next.
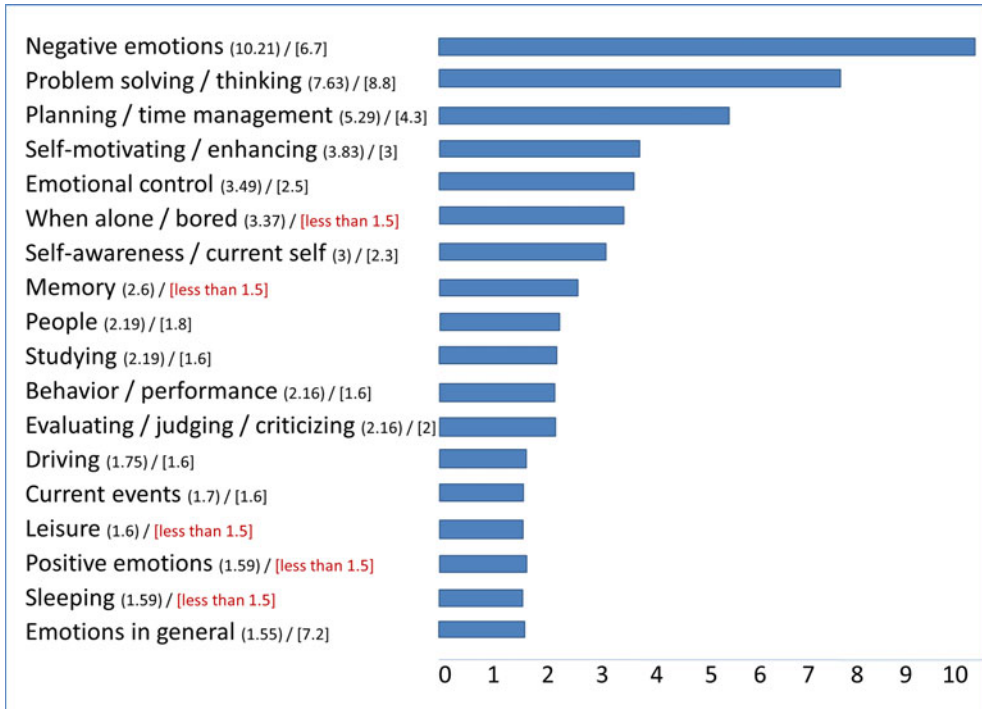
Figure 1. Percentage of category use out of overall instances ($n = 6110$). In first brackets: percentage obtained in the current study. In second brackets: percentage obtained in Morin et al. (2018). In red: categories that were below 1.5% in Morin et al. (2018).

Content Frequency

The total number of inner speech instances reported by the participants was 6110 (minimum = 3; maximum = 59; $SD = 13.83$). On average, they reported 27 instances each. Volunteers' confidence level in the accuracy of their self-reports was 3.92/5 (78%).

Figure 1 displays the most frequently self-reported inner speech topics (60% of all instances). Data reflect the percentage of self-reported category use out of the overall instances. Percentages are also reported in brackets (first bracket = current study; second bracket = Morin et al. [2018] study). Only categories mentioned 1.5% and more are presented in Figure 1. The most frequently self-reported topic was negative emotions (10.21%), followed by problem solving/thinking (7.63%); planning/time management (5.29); self-motivating/enhancing speech (3.83); emotional control (3.49); when alone/bored (3.37); self-reflection (3); and (in decreasing frequency order) memory, people, studying, behavior/performance, evaluating/judging/criticizing, driving, current events, leisure, sleeping, and emotions in general. Some of the remaining 40% (below 1.5%) of inner speech responses are presented in Table 1. Despite a small number of males in our sample (20.7%), we explored gender differences and did not find anything outstanding. Males and females reported the same first top percentage topics presented in Figure 1, with minor frequency differences.

TABLE 1
Comparison Between GISQ Item Endorsement (Study 2) with Frequency of Instances (Study 1)

| Item | GISQ Study 2 | | IS Study 1 | |
	Item endorsement	M	f % *	Code
	Matches			
	"Often" to "very often"		*"Frequent"*	
3	About negative emotions**	4.00	10.21	26
48	When ruminating**	3.98	10.21	26
33	In order to problem solve	4.27	7.63	74
37	In order to plan	4.15	5.29	72
34	In order to motivate myself	3.88	3.83	78
35	In order to control emotions	3.73	3.49	77
46	When alone / bored	4.34	3.37	116
10	Who I am	3.57	3.0	79
44	When remembering	4.43	2.60	85
8	About people around me	3.72	2.19	44
47	When studying	4.07	2.19	82
1	About behavior	3.90	2.16	25
36	In order to think critically	4.07	2.16	34
45	When driving	3.83	1.75	101
19	About leisure	3.02	1.60	96
2	About positive emotions	3.10	1.59	29
31	About sleep	3.43	1.59	110
21	About food	3.83	1.51	31
	"Sometimes"		*"Less frequent"*	
41	In order to listen to my own voice	2.88	1.37	79A
12	About bodily sensations	2.88	.82	17
18	About beliefs	2.83	.54	8
6	About music	2.93	.43	112
	Mismatches			
	"Often" to "very often"		*"Less frequent"*	
49	When using language	3.72	1.47	115
14	About physical activity	3.03	1.42	97
51	When performing hygiene	3.18	1.41	113A
54	When at school	3.82	1.31	99
11	About hypothetical situations	4.17	1.26	35
26	About future	4.29	1.24	121
57	When I want to rely on myself	3.41	1.23	79B
4	About errands	4.02	1.19	113
38	In order to rehearse ahead of time	4.09	1.18	80
13	About family	3.56	1.13	45
20	About friends	3.62	1.13	47
9	About past	3.74	1.05	120
50	When at work	3.28	.98	102
5	About education	4.11	.97	23
52	When meeting people	3.14	.95	92
7	About appearance	3.88	.93	11
43	When walking	4.04	.93	107
40	In order to concentrate	3.91	.87	86

(*Continued*)

TABLE 1
(*Continued*).

53	When mind wandering	4.24	.85	93
29	About health	3.39	.77	9
23	About relationships	4.10	.74	39
39	In order to avoid saying out loud	3.47	.69	75
28	About motives	3.58	.67	19
42	In order to cope	3.83	.64	91
16	About work	3.58	.47	24
30	About ideas	3.44	.47	41
15	About preferences	3.66	.44	33
27	About how I am perceived by others	3.57	.38	38
55	When orienting myself	4.00	.34	21
24	About financial situation	3.77	.29	10
17	About immediate environment	3.16	.29	62
56	When taking transit	3.31	.29	114
32	In order to replay past conversations	3.82	.28	81
25	About intimate partner	3.81	.23	48
	"Sometimes"		*"Frequently"*	
22	About current events	2.88	1.70	119

Note. M = mean, SD = standard deviation; IS = inner speech; code = code from manual in Study 1 as corresponding to GISQ item; face validity: "matches" occurred when items were endorsed often or very often (M between 3 and 5) while occurring "frequently" (reported $\geq$ 1.5% of the time) in Study 1, or when items were endorsed "sometimes" (M between 2 and 2.99) while occurring "less frequently" ($<$ 1.5% of the time) in Study 1. The frequency of percentages in this table do not add up to 100 percent, because the table only represents instances representing GISQ items (10.96% of instances occurred less than .2% of the time and are not represented here); instance code 26 and frequency (10.21%) appears twice, because two items were originally generated from the same code due to broadness of negative emotion instances. See Appendix A for full GISQ item descriptions.

Comparison Between Current Results and Previously Collected Data

We obtained largely comparable frequency results in our previous study (Morin et al., 2018). Frequencies of self-reported inner speech topics in the current and 2018 studies were almost identical, with the exception of when alone/bored, memory, leisure, positive emotions, and sleeping, which were reported between 1.5% and 1% out of the overall inner speech instances, as opposed to between 1.5% and above. Frequencies of all other inner speech topics (40% and less, some presented in Table 1) were also highly consistent with results reported in the previous study. To illustrate, in both the current and 2018 studies, food, family, and reading/writing frequencies were between 1.5% and 1%; health, physical appearance, and mind wandering frequencies were between .9% and .5%; and career, ideas, and dreams were .4% and less. There we some exceptions, however: For example, frequencies for the topics bodily sensations and beliefs in Study 1 were between .9% and .5%, as opposed to less than .1% in the 2018 study.

Discussion

Not surprisingly, our student participants reported talking to themselves about things that matter to them: emotions, people, studying, current events, sleeping, and so on. Inner speech

about one's negative emotions was the most frequently self-reported topic in our sample. This observation fits well with a growing body of research on "emotion regulation," part of a broader "cognitive appraisal" process, which implies changing the direction of an emotional response by reinterpreting its meaning (see O'Toole, Renna, Mennin, & Fresco, in press; Ray, McRae, Ochsner, & Gross, 2010). This process involves two components: (1) correctly identifying one's negative emotion and (2) reevaluating the situation to either reduce the intensity of the negative response or change the negative emotion to a more positive one. Arguably, inner speech represents a powerful cognitive tool well suited for emotion regulation. Indeed, in a meta-analysis of brain areas involved during self-awareness tasks, Morin and Hamper (2012) found that a substantial number of studies pertaining to self-reflection on one's emotions reported activation of the left inferior frontal gyrus—a brain area known to produce inner speech.

Verbalizing about one's emotions is part of a larger process consisting of thinking about various aspects of the self, called "self-reflection" (Morin, 2011). Indeed, our participants reported frequently talking to themselves about their current self, their behavior/performance, evaluating/judging/criticizing (including oneself), driving, current events, leisure, sleeping: cognitive, temporal, and behavioral topics all related to the self. This observation is consistent with an important line of research linking inner speech to self-referential activities (e.g., Bastian et al, 2017; Morin, 2005, 2018). The basic idea is that a significant part of describing, defining, and understanding the self is done through extensive internal verbal conversations we have with ourselves about any and all aspects of our self. This is consistent with narrative psychology (also known as dialogical self; see Bruner, 1996; Harre, 1983; McAdams & McLean, 2013), which postulates that human beings make sense of their personal experiences by constructing stories about them and narrating (telling) them to oneself and others. Self-storytelling allows one to reconstruct one's autobiographical past and imagine one's future, which leads to a sense of unity, purpose, and understanding of the self (D'Argembeau et al., 2014). Although it is implicitly understood that this narrating/telling of self-stories recruits language and inner speech, Hermans (1996) established an explicit connection by stating that we engage in internal dialogs in order to better understand others' possible views of ourselves.

Self-regulatory inner speech (e.g., problem-solving/thinking, planning, time management, self-motivation, and emotional control) was also frequently reported by our volunteers. This is clearly in line with a significant body of research (e.g., Fernyhough, 2016; Tullett & Inzlicht, 2010; Vygotsky, 1943/1962; Winsler, 2009) that identifies self-regulation as being one of the most important functions of inner speech. Note that several inner speech contents were rarely reported—for example, news, politics, society, community, the world, death, and children. One can assume that such topics are not central to a student population but could be more often reported in an older and more mature population.

<div align="center">STUDY 2</div>

Methods

Participants

The same 227 participants used in Study 1 were invited to a classroom setting to spend approximately 60 minutes filling in the current paper package, including a consent form, demographics (also used in Study 1), validation measures, the GISQ, and debriefing form.

Construction of the GISQ

The open-format listing method in Study 1 was a replication of our previous research (Morin et al., 2018), and allowed us to tap into what participants reported talking to themselves about in their everyday lives. We used these results to build what we hope represents a more inductive, rather than a priori approach toward building an ecologically balanced inner speech measure for nonclinical populations, the GISQ.[1] To generate the GISQ items, we included all inner speech topics that were reported 5% or more out of all instances ($n = 2307$, Morin et al., 2018), which led to the creation of 57 items (see Appendix A). This somewhat arbitrary cutoff point was chosen because instances occurring less than 5% of the time were still reflected thematically in more frequently occurring instances, and including instances below 5% would at least double item generation, potentially increasing redundancy. Thus, item contextual prompts included I talk to myself *about* (content; 31 items), I talk to myself *in order to* (functions; 11 items), and I talk to myself *when* (activities; 15 items). The GISQ instructions were as follows: "We use inner speech when we silently talk to ourselves about all sorts of things; inner speech is the little voice we have inside our head. Please rate how often you talk to yourself on average using the following scale: 0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = very often; 5 = all the time, followed by a Likert scale (1 = not confident to 5 = very confident) confidence check (i.e., "How confident are you in the accuracy of your above responses?").

Validation Measures

The following additional measures were administered to all participants in order to explore preliminary construct and psychometric qualities of the GISQ. We administered the inner speech open format form first in the package, asking participants not to flip ahead, to reduce potential order effects bias.

Rumination-Reflection Questionnaire   The Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999) was developed to address the "self-absorption paradox," measuring self-directed attention in nonclinical samples using two distinct factors: self-rumination (an unhealthy, excessive, negative, redundant form of self-focus) and self-reflection (a healthy, genuine, positive curiosity about the self). Both subscales exhibit acceptable reliability as well as validity (except in some cases; e.g., Uttl et al., 2011), each containing 12 items (e.g., reflection: "I love exploring my 'inner' self"; rumination: "I often find myself reevaluating something I've done") and endorsed using a 5-point Likert-scale (from 1 = strongly disagree to 5 = strongly agree). The RRQ has been used in countless studies (e.g., DaSilveira, DeSouza, & Gomes, 2015; Silvia, Eichstaedt, & Phillips, 2005); it exhibits good internal consistency, content validity, test–retest reliability, as well as other related psychometric qualities (for details, see Trapnell & Campbell, 1999). We predicted that both RRQ subscales would at least moderately correlate positively with our GISQ, because inner speech has been shown to be associated with self-reflection (e.g., Morin, 2018) and self-rumination (Nalborczyk et al., 2017).

Self-Talk Scale   The Self-Talk Scale (STS) (Brinthaupt et al., 2009) uses a total score and four subscales (four items each) assessing self-regulatory aspects of inner speech: social assessment (e.g., "I talk to myself when I'm imagining how other people respond to things I've said"), self-criticism ("e.g., I talk to myself when I'm really upset

with myself"), self-management ("e.g., I talk to myself when I need to figure out what I should say or do"), and self-reinforcement (e.g., "I talk to myself when I'm proud of something I've done"). It uses a six-point Likert scale ($1 =$ never to $6 =$ always). The STS has been administered in several studies (e.g., Heavey et al., 2019; Khodayarifard, Brinthaupt, Zardkhaneh, & Azar, 2014; Shi, Brinthaupt, & McCree, 2017) and presents good psychometric qualities (for details, see Brinthaupt et al., 2009). We expected the STS to strongly correlate with our GISQ.

Mind-Wandering Questionnaire   The 5-item Mind-Wandering Questionnaire (MWQ; Mrazek, Phillips, Franklin, Broadway, & Schooler, 2013) assesses the experience of random thoughts in nonclinical populations, defined as not remaining on a single topic for a long period of time, especially when people are engaged in an attention-demanding task (Schooler et al., 2011). One example of a MWQ item is, "I mind wander during lectures or presentations," employing a six-point Likert-scale ($1 =$ almost never to $6 =$ almost always). The MWQ shows high internal consistency as well as convergent validity with existing measures of mind wandering and related constructs. We predicted obtaining at least a moderate positive correlation between the MWQ and our GISQ, as one can postulate that mind wandering, at least in part, is sometimes made up of inner speech episodes. In a thought-sampling study using cell phones, Uttl and collaborators (2012) found that a moderate portion of participants reported experiencing inner speech during mind wandering occurrences.

Self-Consciousness Scale   Scheier and Carver (1985) revised the Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975) to produce a 16-item measure of private self-focus (nine items: e.g., "I'm constantly thinking about my reasons for doing things") and public self-focus (seven items: e.g., "Before I leave my house, I check how I look"), using a four-point Likert scale ($0 =$ not like me at all to $3 =$ a lot like me). The SCS-R correlates with multiple related constructs in several studies (e.g., DaSilveira et al., 2015), exhibiting favorable internal consistency as well as stability over time (for details, see Scheier & Carver, 1985). We foresaw a moderate positive correlation between the SCS-R and our GISQ, given a known association between self-focus and inner speech (Morin, 2018). Indeed, several studies report positive significant correlations between different measures of inner speech and self-related constructs. To illustrate, Schneider (2002) and Schneider et al. (2005) observed a .50 correlation between the Inner Speech Scale (ISS) and the private subscale of the original Self-Consciousness Scale (Fenigstein et al., 1975).

Philadelphia Mindfulness Scale   Mindfulness has been defined as a nonevaluative, nonelaborative attention to and awareness of one's current experience—simply noticing thoughts and emotions as they arise without elaboration or rumination (Carlson, 2013). The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) measures mindfulness in nonclinical samples using a 20-item, bidimensional measure, including a total score and subscales assessing present-centered awareness (eight items: e.g., "I am aware of what thoughts are passing through my mind") and acceptance (eight items: e.g., "There are aspects of myself I don't want to think about"). Using a five-point Likert scale ($1 =$ never to $5 =$ very often), it has acceptable internal consistency and correlates with other related constructs (Cardaciotto et al., 2008). Because mindfulness essentially consists of a nonevaluative/elaborative form of self-attention, it most likely involves "shutting down" one's inner voice—hence, the prediction that the PHLMS and GISQ will negatively correlate.

Results

Data Screening, Descriptive Statistics, Reliability, and Validity

All statistical analyses were conducted in SPSS v. 24. Data were screened for response ranges and missing responses, resulting in no removed data. Participants generally endorsed GISQ items "often" (Table 1; $M = 209.64$, $SD = 35.77$, $N = 224$), with some variance (see Table 2). Group sizes were not comparable, and we found no statistically significant differences between group means for gender on the GISQ (males $N = 45$, females $N = 176$; one did not identify as male or female; M age $= 21$), as determined by one-way ANOVA ($F (2,219) = 2.185$, $p = .115$).

Whereas histograms and boxplots appeared to represent normal distributions, Shapiro-Wilk normality tests showed nonnormal distributions for all measures ($p < .5$). Further investigation of Q-Q plots showed slight deviation from normality at the tails in most cases. Nonparametric analyses were used that produced slightly higher correlations than parametric analyses. Table 3 shows GISQ reliability statistics ($\alpha = .946$), of which overall Cronbach's alpha would increase slightly (to $\alpha = .947$ but not to more than α based on standardized items) if Item 6 ("I talk to myself about 'music'") was removed. The only corrected item-total correlation below .30 was also item 6 ($r = .15$, squared multiple $r = .37$), which, if removed, would decrease the total average 2.96 points.

Table 3 also shows that the GISQ exhibits construct validity in relation to other theoretically convergent and divergent scales. For example, the GISQ significantly correlates positively with the global score of the STS ($r = .64$) and all its subscales, as well as the SCS-R ($r = .52$) and its subscales. An example of divergent validity is the negative correlation we found between the GISQ and the acceptance subscale of the PHLMS ($r = -.38$). Results of GISQ subscale validity are reported in the factor analysis section below.

GISQ Self-Reports of Inner Speech in Content, Activities, and Functions

Participants ($N = 221$) were "fairly confident" in the accuracy of their GISQ endorsements (50% fairly confident, 40% very confident). Participants "very often" endorsed items designed to measure inner speech *about* content, such as (in descending order) future ($M = 4.29$), hypothetical situations ($M = 4.17$), education ($M = 4.11$), relationships ($M = 4.10$), and negative emotions ($M = 4.00$). Further, inner speech was "often" reported about a variety of topics including behavior, finances, past, people, motives, and self-identity.

Participants "very often" reported using inner speech *when* involved in a lack of activities such as when alone/bored ($M = 4.34$), or when involved in activities like studying ($M = 4.07$) and walking ($M = 4.04$). Participants also "often" reported using inner speech when driving, using language, at work or school, meeting people, and when they want to rely on the self. In terms of functions, participants "very often" reported using inner speech *when* remembering ($M = 4.43$), mind-wandering ($M = 4.24$), orienting the self ($M = 4.00$), and *in order to* plan ($M = 4.15$), rehearse ahead of time ($M = 4.09$), and think critically ($M = 4.07$). Furthermore, inner speech was "often" reported in order to concentrate, replay past conversations, motivate oneself, cope, control emotions, and avoid saying out loud what one wants to say.

TABLE 2
(GISQ) Item Descriptive Statistics

Item	N	Rng	Min	Max	M	SD	Var	Skew	SE
1	230	5	0	5	3.90	1.011	1.021	−.831	.160
2	230	5	0	5	3.10	1.353	1.832	−.191	.160
3	230	5	0	5	4.00	1.096	1.201	−1.317	.160
4	230	5	0	5	4.02	1.030	1.061	−1.108	.160
5	230	4	1	5	4.11	.884	.782	−.988	.160
6	230	5	0	5	2.93	1.569	2.463	−.274	.160
7	230	5	0	5	3.88	1.269	1.610	−1.128	.160
8	230	5	0	5	3.72	1.208	1.459	−.845	.160
9	229	5	0	5	3.74	1.144	1.308	−.643	.161
10	230	5	0	5	3.57	1.285	1.652	−.610	.160
11	230	5	0	5	4.17	1.184	1.402	−1.663	.160
12	230	5	0	5	2.88	1.326	1.758	−.273	.160
13	230	5	0	5	3.56	1.191	1.418	−.568	.160
14	230	5	0	5	3.03	1.384	1.916	−.294	.160
15	230	5	0	5	3.66	1.185	1.404	−.873	.160
16	230	5	0	5	3.58	1.309	1.712	−.904	.160
17	229	5	0	5	3.16	1.230	1.513	−.383	.161
18	229	5	0	5	2.83	1.626	2.645	−.233	.161
19	230	5	0	5	3.02	1.195	1.427	−.290	.160
20	230	5	0	5	3.62	1.137	1.293	−.853	.160
21	230	5	0	5	3.83	1.131	1.280	−.913	.160
22	230	5	0	5	2.88	1.319	1.741	−.177	.160
23	230	5	0	5	4.10	1.117	1.247	−1.214	.160
24	230	5	0	5	3.77	1.240	1.538	−.809	.160
25	230	5	0	5	3.81	1.512	2.286	−1.193	.160
26	230	5	0	5	4.29	1.055	1.114	−1.967	.160
27	230	5	0	5	3.57	1.436	2.062	−.765	.160
28	230	5	0	5	3.58	1.167	1.362	−.700	.160
29	230	5	0	5	3.39	1.265	1.601	−.683	.160
30	230	5	0	5	3.44	1.212	1.470	−.376	.160
31	230	6	0	6	3.43	1.322	1.748	−.536	.160
32	230	5	0	5	3.82	1.250	1.562	−.876	.160
33	230	5	0	5	4.27	.927	.859	−1.448	.160
34	230	5	0	5	3.88	1.152	1.327	−.910	.160
35	230	5	0	5	3.73	1.248	1.558	−.980	.160
36	230	5	0	5	4.07	1.021	1.043	−1.083	.160
37	230	5	0	5	4.15	.957	.916	−1.154	.160
38	230	5	0	5	4.09	1.096	1.201	−1.347	.160
39	230	5	0	5	3.47	1.468	2.154	−.734	.160
40	230	5	0	5	3.91	1.179	1.390	−1.298	.160
41	230	5	0	5	2.88	1.741	3.030	−.264	.160
42	230	5	0	5	3.83	1.297	1.681	−1.103	.160
43	229	5	0	5	4.04	1.258	1.582	−1.556	.161
44	230	5	0	5	4.43	.852	.727	−1.680	.160
45	229	5	0	5	3.83	1.515	2.294	−1.336	.161
46	230	5	0	5	4.34	1.105	1.221	−2.095	.160
47	230	5	0	5	4.07	1.102	1.214	−1.197	.160

(Continued)

TABLE 2
(*Continued*).

48	229	5	0	5	3.98	1.237	1.530	−1.220	.161
49	230	5	0	5	3.72	1.261	1.590	−.925	.160
50	230	5	0	5	3.28	1.507	2.272	−.583	.160
51	230	5	0	5	3.18	1.572	2.470	−.509	.160
52	230	5	0	5	3.14	1.555	2.417	−.586	.160
53	230	5	0	5	4.24	1.070	1.146	−1.728	.160
54	230	5	0	5	3.82	1.201	1.442	−1.108	.160
55	229	5	0	5	4.00	1.141	1.303	−1.063	.161
56	230	5	0	5	3.31	1.666	2.775	−.684	.160
57	230	5	0	5	3.41	1.389	1.929	−.751	.160
C	221	3	2	5	4.29	.678	.459	−.686	.164

Note. N = number of completed responses, Rng = actual range (possible range from 0 to 5), Min = actual minimum response, Max = actual maximum response, SD = standard deviation, Var = variance, SE = standard error, C = GISQ confidence ratings. See Appendix A for full GISQ item descriptions.

TABLE 3
Exploratory Reliability (α) and Validity of Inner Speech Correlates to the GISQ Total and Emerging Subscales

Measure	r *with GISQ factor*						
	T (.95)	Refl (.82)	Obsv (.80)	Cog (.79)	Act (.79)	Mang (.67)	Goal (.75)
STS (.88)	.64	.47	.62	.52	.42	.46	.51
Social assessment (.77)	.55	.36	.64	.41	.35	.38	.43
Self-reinforcement (.88)	.44	.51	.14*	.38	.38	.30	.29
Self-criticism (.84)	.41	.24	.58	.28	.27	.33	.36
Self-management (.76)	.52	.31	.50	.54	.30	.37	.50
SCS-R (.80)	.52	.40	.56	.23	.36	.25	.46
Private self-consciousness (.67)	.47	.47	.40	.28	.35	.19	.34
Public self-consciousness (.82)	.44	.22	.55	.12	.27	.23	.46
RRQ *Rumination* (.88)	.29	.13	.56	.14	.18	.16*	.27
RRQ *Reflection* (.88)	.28	.40	.50	.24	.28	.04	.07
PHLMS (.74)	−.09	.07	−.25	.01	−.11	−.03	−.05
Awareness (.79)	.31	.33	.20	.24	.21	.16*	.23
Acceptance (.84)	−.38	−.18	−.49	−.21	−.30	−.18	−.27
MWQ (.84)	.23	.12	.34	.10	.12	.13*	.24

Note. r = Spearman's correlations; all correlations are significant at the .001 level, except those indicated by * (significant at the .005 level) and those shaded (nonsignificant). Italics indicate subscales. T = total scale, Refl = self-reflection, Obsv = self-observation, Cog = cognition, Act = activities, Mang = self-management, Cope = coping; STS = Self-Talk Scale, SCS-R = Self-Consciousness Scale Revised, RRQ = Rumination Reflection Questionnaire, PHLMS = Philadelphia Mindfulness Scale, MWQ = Mind-Wandering Questionnaire. RRQ total correlations are not presented, because the total score is not used.

Comparing Phenomenology Results (Study 1) to the GISQ (Study 2)

In relation to its phenomenological roots and content validity, Table 1 shows that the most frequently ($\geq 1.5\%$) self-reported inner speech topics found in Study 1 (using the open-format form) were also commonly endorsed on the GISQ. For example, the GISQ item I talk to

myself "about negative emotions" was both endorsed "often" ($M = 4.0$) and occurred frequently in Study 1 (10.2% of 6110 instances), whereas "in order to problem-solve" ($M = 4.27$) occurred 7.6% of the time in Study 1, and "in order to plan" ($M = 4.15$) occurred 5.3% of the time in Study 1. Other items following this trend were in order to "motivate myself" and "control emotions," as well as when "remembering" and about "who I am." On the matching low end, the GISQ item "I talk to myself about 'bodily sensations'" was endorsed "sometimes" ($M = 2.88$), and also occurred less frequently (0.7%) in Study 1, whereas the item in order to "listen to my own voice" was endorsed "sometimes" ($M = 2.88$) and occurred less frequently (1.37%), with the same pattern found when looking at inner speech about music ($M = 2.93$; .4% of instances).

Table 1 also shows that some differences (mismatches) between results from Study 1 and the GISQ emerged. A majority of instances (83%) that emerged in Study 1 were reported less frequently ($< 1.5\%$ of instances); however, on average, most GISQ items (91%) were endorsed "often" to "very often." In other words, we found that in general, less frequently reported inner speech topics in Study 1 were reported on the GISQ as occurring more often. Some examples of this trend include "I talk to myself about 'future'" ($M = 4.29$; 1.25%) and when "mind wandering" ($M = 4.24$; .7%). We did not find any cases in which more frequently reported instances in Study 1 were endorsed "never" or "rarely" in the GISQ. Within this mismatch category, there was still an overall trending match, such that GISQ averages declined while frequency of associated reported instances also declined.

GISQ Exploratory Factor Analysis

We began with principle axis factoring and visually inspected the scree plot using Eigenvalues greater than 1 as a guide. In combination with subject matter review of resulting item loadings, we found 14 potential factors. We then used an oblique promax rotation, of which the correlation matrix showed that correlations off the main diagonal were larger in absolute value than .2, and there was a moderate degree of relationship between some factors. Table 4 shows the resulting pattern matrix. For efficient visibility, we asked SPSS not to print coefficients below .2. Lower than ideal loadings should be considered with new measures for item and factor revision purposes (Hair, Black, Babin, Anderson, & Tatham, 2009). Out of 57 items, 10 reached ideal loading, 17 reached acceptable loading, and most other items reached the current minimum exploratory loading expectation (at least .3), with exception of some, such as Items 53 (when "mind wandering") and 8 (about "people around me"). Very few items had complex loadings ($\geq .3$ on more than one factor).

The extracted factors cumulatively accounted for 65.42% of the variance, and Item 6 (about music) had the lowest extracted communality (.349); but, in general, items were well represented (communality $> .4$) inside the factor space. Considering lower than ideal loadings at this stage, we found four moderately strong factors (self-reflection, self-observation, cognition, and activities), two moderate factors (self-management and self-goals), two moderately weak factors (relationships and mental planning), and five weak factors (a second activities factor, coping, language, and two unnamed factors). Item 39 (self-censorship) loaded on its own.

Table 3 presents reliability of these moderately strong and moderate exploratory GISQ subscales (and the earlier mentioned total distribution), showing acceptable reliability ($\alpha \geq .7$) in all cases except one (self-management, $\alpha = .67$). Table 3 also shows convergent and divergent validity of these proposed subscales in relation to other measures, showing moderate exploratory validity. For example, the GISQ subscale for the factor of self-observation

TABLE 4
GISQ Promax Rotated Factor Components (Eignvalues > 1) with Variance Explained

Item								Factor						
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
30	**.742**													
10	**.658**													
2	**.657**													
28	**.624**					.354							.220	
18	**.514**							.212						
15	.485						.208						.315	
19	.402											.285	.296	
22	.379		.218		.219									
12	.282										.238		.250	
9		**.877**												
3		**.746**												
32		**.643**								.213				
27		**.567**						.204						.216
48		.491												
1	.344	.351												
37			**.675**			.311								
33	.235		**.657**											
36	.229		**.562**											
44			.486		.284					.255				
34	.341		.434											
55		.253	.354								.272			
56				**.685**										
51				**.668**										
52				**.622**							.235			.216
57			.204	.445		.344		.318						
54	.206			.363										
21					**.781**									
31					**.623**									
29	.299				.353									
24					.351		.250	.280						
5			.205			**.783**								

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4	**.614**											.296		.218
16	.392	.351			.212						.217			
7	.355				.263						.217			
26	.335							.260	.256					
53	.273													
45		**.719**	.344											
50		**.575**												
46		**.558**												
43		.470	.224	.235				.277						
42			**.757**							.220				
41			.420					.257		.220				
35	.220	.357	.410											
40			.359		.223		.260		.222					.235
13	.269		.328		.251	.201								
8		.201			.287	.204								
25				**.820**										
23				**.803**										
11	.217				**.588**									
38					**.514**			.205						
47						**.691**								
49						.452								
6							**.628**							
20	.305				.251		.486							
14			.356					**.732**						
17	.207	.234		.236				.316						
39			.356		.251								.316	.372
E	14.88	3.02	2.70	2.54	2.21	1.78	1.70	1.41	1.35	1.28	1.21	1.12	1.08	1.04
V	26.1	5.29	4.73	4.45	3.87	3.13	2.99	2.47	2.36	2.24	2.12	1.95	1.90	1.82
CV	26.1	31.39	36.12	40.58	44.45	47.57	50.56	53.04	55.40	57.64	59.76	61.70	63.60	65.42

Note. Bold = loading ≥ .5; loadings below .2 are not represented here. E = eignvalue, V = variance accounted for by each factor, CV = cumulative variance accounted for by current and preceding factors. Factor component list: 1 = self-reflection, 2 = self-observation, 3 = cognition, 4 = activities, 5 = self-management, 6 = goals, 7 = activities2, 8 = coping, 9 = relationships, 10 = mental planning, 11 = language, 12 = unspecified, 13 = unspecified2, 14 = self-censorship. See GISQ for full item descriptions.

correlated with the STS subscale of self-criticism ($r = .58$) and the RRQ subscale of rumination ($r = .56$). Weaker relationships also emerged between theoretically unrelated (or less related) measures; for example, the same factor of self-observation was negatively related to the PHLMS subscale of acceptance ($r = -.49$), and the GISQ factor of reflection was not significantly related to RRQ subscale of rumination ($r = .13$).

Regarding internal consistency of these subscales, inter-item coefficients showed that positive coefficients resulted between most items on associated extracted factors, with a spread of weaker relationships resulting between items from different factors. Some items also had moderately weak to weak relationships with the other items in their respective factors. Some moderate associations also existed between items loading on different factors. These relationships for the GISQ subscales were acceptable ($r \geq .3$).

Discussion

Overall, these exploratory analyses show that multiple distinct theoretical factors beyond those captured by existing questionnaires underpin responses to the first version of the GISQ, with strong reliability and moderate validity, including corresponding content validity with reports of inner speech experiences in Study 1. The four strongest factors resulting from Study 2 are self-reflection (e.g., ideas, who I am, motives, beliefs, and preferences), cognition (planning, problem solving, critical thinking, and memory), inner speech accompanying activities (on transit, performing hygiene, and meetings), and self-management (finances, education, and errands).

As it stands, the current results show that all factors could benefit from strengthening, but factors requiring the most revision are the second activities factor, coping, relationships, mental planning, and language. Item 6 (about music) does not statistically fit any factor, whereas statistics and face validity indicate that items such as 53 (when mind wandering), 8 (about people around me), 28 (about motives), and 1 (about behavior) need to be reconstructed to represent more distinct factors. Furthermore, face validity indicates that some items also cross over theoretical constructs, such as mental time travel and autobiography (e.g., Schacter, Benoit, & Szpunar, 2017), in order to "replay past conversations," and about "past events". Other limitations include occasional double-barreled items (e.g., "I talk to myself when alone" [e.g., bored]) and lack of context (e.g., about "sleep" can be thought of as getting ready for bed, sleep itself, or when waking up).

Moreover, regardless of statistical fit, face validity suggests the limitation that some additional items do not fit extracted factors well. However, these items are still derived from phenomenology, indicating possible additional underlying factors involved in inner speech that require teasing apart. For example, reports of inner speech about positive emotions and negative emotions indicate an emotions factor should be considered. Furthermore, reports of inner speech in order to "motivate myself" and to "rely on myself" indicate a possible underlying self-reinforcement factor (consistent with Brinthaupt et al., 2009). Although no pure self-regulation factor emerged from factor analysis, it is interesting to note that our factors of cognition and coping also contain references to self-regulatory activities, consistent with the literature (e.g., Vygotsky, 1943/1962).

The GISQ shows moderate content validity as it intuitively correlates with related measures. Importantly, total and subscale responses correlate with all subcales of the STS—an established self-talk questionnaire (Brinthaupt et al., 2009). Furthermore, the GISQ

correlates positively with both RRQ subscales, most likely because inner speech is known to be involved in self-reflection and self-rumination (Morin, 2018). As expected, results also support an inner speech association with mind wandering episodes (as assessed by the MWQ) and self-consciousness (SCS-R). Also expected was a negative link to mindfulness (PHLMS), such that as mindfulness increases, inner speech decreases, because of its noneva-luative/elaborative quality of self-focus (Carlson, 2013). This makes sense, as in essence mindfulness represents an effort to repress inner speech.

Another observation is that a majority of less frequently self-reported inner speech instances found in Study 1 were endorsed more often on the GISQ, perhaps because the GISQ does a better job of probing for inner speech instances than the open format measure, as it provides participants with specific prompts rather than a blank box. Therefore, we will consider less frequently occurring instances for item generation in the future. For example, perhaps participants did engage in mind wandering episodes using inner speech, but failed to self-report this in Study 1 as a result of being unaware of these experiences, or not knowing how to phrase such experiences. In line with this logic, Heavey and Hurlburt (2008) argued that responses on inner experience questionnaires may be inflated in comparison to results of fMRI studies. Participants also generally endorsed GISQ items "often," in line with the observation that people overall report using inner speech quite frequently (i.e., over 20% of the time when probed with DES techniques; Heavey & Hurlburt, 2008).

Despite not representing a definitive version of the instrument with finalized psychometric assessment, we propose that researchers can use the current iteration either to measure inner speech in a broad sense or to take and adapt some of its factors for specifically defined, the-oretically sound purposes.

GENERAL DISCUSSION AND CONCLUSION

In this article we have presented two studies aimed at addressing one common issue per-taining to the measurement of inner speech: the fact that current techniques (e.g., thought sampling methods and self-report scales) provide little information about the actual content of naturally occurring inner speech in everyday life. To counter this shortcoming, in Study 1 we used a thought-listing procedure asking participants to freely report typical inner speech instances in an open-format form. Replicating previous results employing the same technique (Morin et al., 2018), we observed frequent self-regulatory and self-referential inner speech (especially negative emotions), as well as multiple other functions and topics, such as driving, current events, leisure activities, sleeping, memory, and reading/writing. To our knowledge, this information was calculated using the most comprehensive coding system presently in existence.

In Study 2 we relied on this inner speech frequency information to design the GISQ and created 57 items assessing inner speech based on what participants report typically talking to themselves about. The GISQ exhibits moderately good preliminary psychometric qualities such as internal and external reliability and validity and, importantly, represents in our view a more ecologically valid instrument not designed based on some a priori ideas as to what inner speech is used for or made up of. As such, our more inclusive instrument is designed to measure a wide array of inner speech topics and functions instead of specific functions (e.g., the STS) or phenomenological qualities of the instances themselves (e.g., the VISQ).

Our GISQ certainly requires further validation work, especially test–retest reliability and more content validity confirmation using additional scales assessing inner speech and self-related constructs. The GISQ also needs to be administered to several more participants to refine our knowledge of its in-depth psychometric qualities. We hope that, once refined, the GISQ will be useful in looking at connections between some of its subscales (factors) and measures of learning, performance, memory, motivation, and more. Potentially intriguing research questions directly pertaining to inner speech are individual differences in inner speech across the lifespan as well as in psychopathological populations. Do younger and older people talk to themselves more or less frequently about specific topics and for similar or different purposes? This same question also applies to depressed, addicted, and anxious versus healthy participants. We also foresee using the GISQ to explore potential cultural differences: Do people from individualistic and collectivist backgrounds report using inner speech for similar or different reasons? Arguably, a more global, encompassing, measure of inner speech—the GISQ—will be required to answer such questions.

NOTE

1. Again, we created the GISQ based on data gathered in our 2018 study (Morin et al., 2018). Because self-reported inner speech content in the current Study 1 was highly similar to what was obtained in 2018, we did not feel the need to modify the GISQ and administered the version that was built using prior data.

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APPENDIX A: GENERAL INNER SPEECH QUESTIONNAIRE

We use inner speech when we silently talk to ourselves about all sorts of things; inner speech is the little voice we have inside our head. Please rate how often you talk to yourself on average using the following scale: 0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = very often; 5 = all the time.

I talk to myself **about**:
1. Behavior (e.g., performance, actions)
2. Positive emotions
3. Negative emotions
4. Errands (e.g., appointments, chores)
5. Education
6. Music (e.g., singing, guitar, composing)
7. Appearance (e.g., weight, clothing, hair)
8. People around me
9. Past events
10. Who I am
11. Hypothetical situations (e.g., imaginary, possible)
12. Bodily sensations
13. Family

14. Physical activity (e.g., sports, gym)
15. Preferences (e.g., wants, needs)
16. Work (e.g., job, career)
17. Immediate physical environment
18. Beliefs (e.g., religion, philosophy)
19. Leisure (e.g., hobbies, TV, movies)
20. Friends
21. Food / what to eat
22. Current events
23. Relationships
24. Financial situation
25. Intimate partner
26. Future
27. How I am perceived by others
28. Motives (e.g., goals)
29. Health
30. Ideas (e.g., insight, creativity)
31. Sleep

I talk to myself **in order to**:

32. Replay past conversations
33. Solve problems (e.g., decide, debate)
34. Motivate myself (e.g., self-encouragement)
35. Control emotions
36. Think critically (e.g., evaluate, judge, criticize)
37. Plan (e.g., time-management)
38. Rehearse ahead of time
39. Avoid saying out-loud what I want to say
40. Concentrate
41. Listen to my own voice (e.g., I can hear my voice)
42. Cope

I talk to myself **when**:
43. Walking
44. Remembering (e.g., to recall, use my memory)
45. Driving
46. Alone (e.g., bored)
47. Studying
48. Ruminating (e.g., repetitive worrying)
49. Using language (e.g., reading, writing, calculating)
50. At work
51. Performing hygiene
52. Meeting people
53. Mind wandering (e.g., random thoughts)
54. At school
55. Orienting myself (e.g., mapping, finding lost items)
56. Taking transit (e.g., c-train, bus, taxi)
57. I want to rely on myself (e.g., I know best)

How confident are you in the accuracy of your above responses?
Not confident at all   *very confident*

| 1 | 2 | 3 | 4 | 5 |