Consciousness and Cognition 20 (2011) 1586–1593

Contents lists available at SciVerse ScienceDirect

Consciousness and Cognition

journal homepage: www.elsevier.com/locate/concog

The varieties of inner speech: Links between quality of inner speech and psychopathological variables in a sample of young adults

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ARTICLE INFO

Article history:
Received 14 January 2011
Available online 30 August 2011

Keywords:
Anxiety
Auditory hallucination
Cognitive behavioral therapy
Depression
Dialogic
Inner speech
Rumination
Vygotsky

ABSTRACT

A resurgence of interest in inner speech as a core feature of human experience has not yet coincided with methodological progress in the empirical study of the phenomenon. The present article reports the development and psychometric validation of a novel instrument, the Varieties of Inner Speech Questionnaire (VISQ), designed to assess the phenomenological properties of inner speech along dimensions of dialogicality, condensed/expanded quality, evaluative/motivational nature, and the extent to which inner speech incorporates other people's voices. In response to findings that some forms of psychopathology may relate to inner speech, anxiety, depression, and proneness to auditory and visual hallucinations were also assessed. Anxiety, but not depression, was found to be uniquely positively related to both evaluative/motivational inner speech and the presence of other voices in inner speech. Only dialogic inner speech predicted auditory hallucination-proneness, with no inner speech variables predicting levels of visual hallucinations/disturbances. Directions for future research are discussed.

1. Introduction and Method

When asked by Theaetetus to define thought, Socrates replied, "As the talk which the soul has with itself... the soul... when it thinks, is merely conversing with itself, asking itself questions and answering" (Plato, 1987, 189e). Despite an entrenched skepticism about the possibility of a scientific study of such experiences (Hurlburt & Schwitzgebel, 2008), recent years have seen a re-emergence of interest in inner speech, including its phenomenology, meaning, use, and development (e.g., Wiley, 2006). The importance of understanding inner speech is brought into focus by theoretical perspectives which see it as having a key role to play in cognition and behavior (Fernyhough, in press).

One limitation of existing empirical studies of inner speech is the widespread assumption that inner speech is comparable in form and structure to overt speech. For example, inner speech in neuroimaging studies is typically conceived of as the "subjective phenomenon of talking to oneself, of developing an auditory–articulatory image of speech without uttering a sound" (Levine, Calvanio, & Popovics, 1982, p. 391). In such studies inner speech is often elicited by asking participants to repeat words or sentences silently to themselves in the scanner (e.g., Shergill, Bullmore, Simmons, Murray, & McGuire, 2000). From other theoretical perspectives, however, it is considered that inner speech has a number of properties that distinguish it from external speech (Jones & Fernyhough, 2007a).

Firstly, inner speech has been proposed to have a *dialogic* quality. Vygotsky (1987) argued that inner speech was irreducibly social in origin, being formed when external dialogs between children and their caregivers gradually became internalized over the course of development. For example, a puzzle-solving process involving mother and child will involve

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doi:10.1016/j.concog.2011.08.005

an external dialog between them, with the mother typically asking the child questions and the child answering (Fernyhough, 2009). The gradual internalization of these social exchanges (Wertsch, 1980) guarantees that inner speech has an inherently dialogic nature, in the sense of an ongoing interplay between different internalized perspectives (Fernyhough, 1996; Fernyhough, 2008).

Secondly, inner speech frequently has a *condensed* nature. The internalization of external dialog to form inner speech has been proposed to be accompanied by processes of syntactic and semantic abbreviation (Vygotsky, 1987). This has led to the proposal that inner speech takes at least two forms, *condensed* and *expanded* (Fernyhough, 2004), a view which is backed up by findings from the study of children's private speech (Fernyhough, 2009) and by the evidence from introspection (Martínez-Manrique & Vicente, 2010).

Our third area of interest is the extent to which inner speech features the presence of *other people*. If the Vygotskian view is correct, internal dialogs should feature different voices in interaction. Indeed, Fernyhough (1996) has argued that this view of the development of verbal thinking entails that our inner speech will be shot through with other voices. Studies of the quality of inner speech would therefore benefit from attending to the question of whether the voices of other people feature in typical inner speech.

A final key aspect of inner speech is its use for *evaluating* situations, people, and the self. Self-evaluation has been proposed to be mediated by inner speech and to play a key role in self-awareness (Morin, 1993). The use of evaluative inner speech may also be linked to the tendency to take the position of a detached other on our own experiences (Vocate, 1994), and may be expected to relate to the presence of the voices of other people in inner speech. Evaluative inner speech is also thought to have an important motivational function (Hardy, Hall, & Hardy, 2005).

To date, a rich Vygotskian conception of inner speech has not been used to inform the development of an inner speech questionnaire. For example, the Self-Verbalization Questionnaire (SVQ; Duncan & Cheyne, 1999) assesses the cognitive and self-regulatory functions of private speech (audible speech intended for the self, not others), yet is not designed to assess inner speech or qualitative aspects of private speech such as dialogicality and condensation. One questionnaire which does indirectly assess condensed inner speech is the Self-Talk Use Questionnaire (STUQ; Hardy, Hall, & Hardy, 2004). This asks participants whether their self-talk (which may be overt or covert) takes the form of single words, phrases, or complete sentences. Hardy, Hall, and Hardy (2005) administration of the STUQ to athletes supported the idea of a condensed/expanded inner speech distinction. Twenty-three percent of athletes' self-talk involved single words, 59% involved phrases, and only 18% was in the form of full sentences. Although 65% of athletes' self-talk was covert, no sub-analyses specifically examined the condensed nature of inner (covert) speech. Questionnaires which focus specifically on inner speech, such as the Self-Talk Scale (STS: Burnett, 1996), have provided information relevant to the evaluative nature of inner speech, but mainly through asking whether the predominant affective tone is positive or negative. Thus, at present no inner speech questionnaire addresses the full range of qualitative and functional aspects of inner speech that flow from Vygotsky's theory.

One reason for developing such a questionnaire lies in its potential use for exploring inner speech's relation to psychopathology. For example, anxiety and depression are known to be associated with ruminative thought processes (e.g., Harrington & Blakenship, 2002; Nolen-Hoeksema, 2000), with rumination being a predominantly verbal process (Nolen-Hoeksema, 2004). Establishing whether specific qualities of inner speech relate to levels of such states may help guide the further development of therapeutic interventions for these disorders, such as cognitive behavioral therapy. A second example of a relation between inner speech and potentially distressing mental experiences can be found in the example of auditory verbal hallucinations (AVHs, or 'hearing voices'). Inner speech models of AVHs propose that the raw material of such experiences is the voice-hearer's own inner speech (e.g., Jones & Fernyhough, 2007b) which is misattributed to an external source. Yet no studies to date have considered the relation between AVHs and qualitative aspects of inner speech in non-clinical populations. This question is particularly relevant given a growing appreciation that AVHs can form part of typical human experience (e.g., Johns & van Os, 2001). We were concerned to establish whether any relation between our inner speech variables and AVHs was specific to the auditory modality, and not to hallucinations in general (in visual hallucinations, for example, one would expect no relation to inner speech). To achieve this end, we aimed to control for levels of proneness to visual hallucinations.

2. Method

2.1. Participants

Two hundred and thirty-five students (77 men) at a UK university with a mean (SD, range) age of 20.38 (2.90, 18–30) took part in the first stage of the study. Participants were recruited via e-mail invitation. There was no financial incentive to participate and all answers were given anonymously, with the participants only indicating their age and gender. A second separate sample of 220 students (47 men) with a mean (SD, range) age of 22.95 (3.52, 18–30) took part in the second stage of the study. These participants indicated their age and gender, and if they wished to take part in a follow-up study (where test–retest reliability was to be assessed; see below) they entered their email address. Ethical approval was obtained from the relevant university ethics committee. On-line questionnaires have been shown to be a reliable method of data collection for psychopathological variables (Jones, Fernyhough, de-Wit, & Meins, 2008).

2.2. Procedure and measures

Participants in the first stage of the study completed the pilot version of our inner speech questionnaire. Those in the second stage completed the questionnaires below in the following order.

2.3. Predisposition to auditory hallucinations

This was assessed using a modified version of the Predisposition to Auditory Hallucinations subscale of Morrison, Wells, and Northard's (2000) Revised Launay-Slade Hallucination Scale (LSHS-R: Bentall & Slade, 1985). Morrison et al.'s scale was modified due to its relatively low internal reliability (previously reported by Morrison et al. as being $\alpha = .62$), which was likely due to the item "I have been troubled by hearing voices in my head" having a very low endorsement rate. Our revised scale consisted of five items from the LSHS-R, namely "I hear a voice speaking my thoughts aloud", "I hear the telephone ring and find that I am mistaken", "I hear people call my name and find that nobody has done so", "I can hear music when it is not being played", and "I have had the experience of hearing a person's voice and then found that there was no one there". Each item is scored on a five-point Likert scale ranging from "never" (0) to "almost always" (4). Scores can hence range from 0 to 20, with higher scores indicating a greater predisposition to auditory hallucinations and disturbances. As reported in our Section 3, this measure was found to have satisfactory psychometric properties.

2.4. Predisposition to visual hallucinations and disturbances

This was assessed using a modified version of the Predisposition to Visual Hallucinations and Disturbances subscale of Morrison et al.'s (2000) LSHS-R. This scale was modified due to concerns over its face validity, for example, this scale includes the auditory-related item: "I have had the experience of hearing a person's voice and then found that there was no one there". Predisposition to visual hallucinations and disturbances in our study was assessed using a four-item scale consisting of items from the LSHS-R, namely, "When I look at things they look unreal to me", "I see shadows and shapes when there is nothing there", "When I look at myself in the mirror, I look different" and "When I look at things, they appear strange to me". Each item is scored on a five-point Likert scale ranging from "never" (0) to "almost always" (4). Scores can hence range from 0–16, with higher scores indicating a greater predisposition to visual hallucinations and disturbances. As reported in our Section 3, this measure was found to have satisfactory psychometric properties.

2.5. Anxiety and depression

This was assessed using the 14-item Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), which consists of an anxiety subscale, comprised of seven items (e.g., "In the past month worrying thoughts have gone through my mind"), and a depression subscale also consisting of seven items (e.g., "In the past month I have lost interest in my appearance"). Items are scored on a four-point Likert scale, with total scores on each scale potentially ranging from 0–21, with higher scores representing higher levels of anxiety/depression. This scale has been shown to have satisfactory psychometric properties (Zigmond & Snaith, 1983).

2.6. Varieties of Inner Speech Questionnaire (VISQ)

The development of this tool is described in Section 3.1 below. Items are scored on a six-point Likert scale with categories of "Certainly applies to me" (6), "Possibly applies to me" (5), "If anything, applies to me slightly" (4), "If anything, slightly does not apply to me" (3), "Possibly does not apply to me" (2), "Certainly does not apply to me" (1).

3. Results

3.1. Development of the Varieties of Inner Speech Questionnaire (VISQ)

Twenty items addressing the dialogic, condensed, and evaluative/motivational properties of inner speech, as well as the presence of the voices of others in inner speech, were developed based on discussions with students and informal piloting of a range of question wordings. This 20-item inner speech questionnaire was then administered to the first set of participants ($N = 235$). Missing data formed less than 0.5% of the total responses, and such data points were replaced by the mean response value for that item from all other participants. Exploratory factor analysis (EFA) was performed using principal components analysis (PCA) with oblique rotation (direct oblimin) on the basis that factors were thought likely to correlate with each other. Items were removed from the questionnaire if they met predefined criteria, specifically if they had a communality of less than .4, or if they failed to load >.5 onto a single factor. As a result, one item ("I speak to myself in my mind about things I ought or ought not to do, e.g., I should do this") was removed from the analysis due to the communality criterion, and another item ("Rather than putting a question to another person, I will debate it with myself in inner speech") was removed as it failed to load >.5 on a single factor.

Table 1
Items on the Varieties of Inner Speech Questionnaire (VISQ), and their factor structure.

Item	Factor loadings			
	Factor 1 (Dialogic Inner Speech)	Factor 2 (Condensed Inner Speech)	Factor 3 (Other People in Inner Speech)	Factor 4 (Evaluative/ Motivational Inner Speech)
I think to myself in words using brief phrases and single words rather than full sentences	.09	**.78**	.03	.05
When I am talking to myself about things in my mind, it is like I am going back and forward asking myself questions and then answering them	**.80**	−.02	−.04	−.10
I hear the voice of another person in my head. For example, when I have done something foolish I hear my mother's voice criticising me in my mind.	.09	.10	**−.79**	−.09
I experience the voices of other people asking me questions in my head	.23	.02	**−.73**	−.08
I hear other people's voices nagging me in my head	.05	.03	**−.81**	−.02
My thinking in words is more like a dialog with myself, rather than my own thoughts in a monolog	**.76**	.04	.01	.01
I think to myself in words using full sentences[a]	−.21	**.76**	−.03	−.07
My thinking to myself in words is like shorthand notes, rather than full, proper, grammatical English	.03	**.77**	.10	.03
I think in inner speech about what I have done, and whether it was right or not	.01	−.11	−.02	**.66**
When I am talking to myself about things in my mind, it is like I am having a conversation with myself	**.78**	−.08	−.01	.15
I talk silently to myself telling myself to do things	.29	.12	.05	**.61**
I hear other people's actual voices in my head, saying things that they have never said to me before	−.10	−.09	**−.75**	.07
I talk back and forward to myself in my mind about things	**.70**	−.10	−.08	.27
My thinking in words is shortened compared to my normal out-loud speech. For example, rather than saying to myself things like 'I need to go to the shops', I will just say 'shops' to myself in my head	.06	**.79**	−.09	.11
If I were to write down my thoughts on paper, they would read like a normal grammatical sentence[a]	−.10	**.74**	−.09	−.14
I hear other people's actual voices in my head, saying things that they actually once said to me	−.17	−.01	**−.79**	.17
I talk silently to myself telling myself not to do things	.18	.07	−.05	**.73**
I evaluate my behavior using my inner speech. For example I say to myself, "that was good" or "that was stupid"	−.15	.01	−.04	**.88**

[a] Item reverse scored, loading co-efficients <.3 displayed in bold.

Table 2
Descriptive statistics ($N = 220$).

	Mean (SD, range)	Cronbach's alpha	Test–retest reliability
VISQ: Condensed Inner Speech	15.09 (5.60, 5–28)	.80	.61*
VISQ: Dialogic Inner Speech	17.80 (4.67, 5–24)	.83	.69*
VISQ: Other People in Inner Speech	11.99 (6.66, 5–30)	.88	.66*
VISQ: Evaluative/Motivational Inner Speech	18.68 (4.31, 4–24)	.80	.80*
Auditory hallucinations	9.46 (3.02, 5–20)	.73	–
Visual hallucinations/disturbances	1.82 (.92, 0–4)	.78	–
HADS: Anxiety	8.05 (4.18, 1–20)	.83	–
HADS: Depression	4.60 (3.81, 0–21)	.81	–

* $p < .001$. VISQ = Varieties of Inner Speech Questionnaire, HADS = Hospital Anxiety and Depression Scale.

The EFA was re-performed after removal of these two items, and it was found that all remaining items had communalities >.4 and loaded >.5 on a single factor. The revised 18-item questionnaire was termed the Varieties of Inner Speech Questionnaire (VISQ; see Table 1). The Kaiser–Meyer–Olkin measure of sampling adequacy was .83, and Bartlett's test of sphericity was significant, $\chi^2(153) = 1731.52$, $p < .001$). Scree-plot inspection, Kaiser's rule, and parallel analysis using a Monte Carlo analysis with 1000 repetitions all suggested the extraction of four factors, with eigenvalues of 4.45, 3.43, 2.20, and 1.28. This accounted for 63.37% of the observed variance. The four factors of the VISQ clearly related to Condensed Inner Speech (items 1, 7, 8, 14, and 15), Dialogic Inner Speech (2, 6, 10 and 13), Other People in Inner Speech (items 3, 4, 5, 12, and 16) and Evaluative/Motivational Inner Speech (9, 11, 17, and 18). Factor loadings are shown in Table 1.

The data from the administration of the VISQ to a second sample of participants ($N = 220$) were subject to confirmatory factor analysis using AMOS 7.0. As data for each of the four VISQ scales were non-normally distributed, $D = .08–.15$, all $p < .01$, initial analysis was performed using the asymptotically distribution free (ADF) method. However, this performs poorly for the present sample size (Bentler & Yuan, 1999). Fit was hence adjudged using Bentler and Yuan's (1999) F statistic (T_F), a modification of the ADF statistic which performs well with non-normal data in sample sizes as low as 90. Other

Table 3
Frequency of responses (%) to VISQ items by subscale.

Response	Condensed Inner Speech	Dialogic Inner Speech	Other People in Inner Speech	Evaluative/Motivational Inner Speech
Certainly applies to me	7.4	27.6	7.6	34.5
Possibly applies to me	16.2	31.3	8.7	30.7
If anything, applies to me slightly	12.5	18.3	9.5	17.3
If anything, slightly does not apply to me	17.9	8.9	8.4	6.9
Possibly does not apply to me	26.7	8.9	21.8	5.9
Certainly does not apply to me	19.3	5.0	44.0	4.7

goodness of fit indices (such as GFI, CFI, and RMSEA) depend on the choice of estimation method. As AMOS 7.0 is unable to recalculate such goodness of fit statistics for use of the T_F estimation method, we were only able to report such statistics for the ADF method. As shown below, the more appropriate T_F statistic suggested better model fit than the ADF statistic, and hence the GFI, CFI, and RMSEA fit statistics reported below, based on the ADF statistic, are likely to be underestimates.

The standard minimum fit chi-squared was a poor fit to the data, $\chi^2_{ADF}(153) = 1500.86$, $p < .001$. Similarly, a one-factor solution was found to differ significantly from the data, $T_F(128,92) = 2.56$, $p < .001$ [$\chi^2_{ADF}(135) = 780.27$, $p < .001$, GFI = .81, CFI = .52, RMSEA = .15 (90% CI = .14–.16)]. However, the proposed four-factor solution did not differ significantly from the data, $T_F(128,92) = 1.15$, $p > .05$ [$\chi^2_{ADF}(128) = 355.51$, $p < .001$, GFI = .91, CFI = .83, RMSEA = .09 (90% CI = .08–.10)]. In this model standardized regression weights ranged from .61 to .96. As shown in Table 2, each subscale of the VISQ had satisfactory internal reliability. Thirty-six participants volunteered to recomplete the VISQ one month later. Test–retest reliability was acceptable for all subscales of the VISQ, with all correlations in excess of .6 (and significant at $p < .001$).

3.2. Descriptive statistics

Mean scores, standard deviations, and Cronbach's alpha for these scales are presented in Table 2. HADS data were analyzed using Zigmond and Snaith's (1983) criteria that a score on either of the HADS subscales of 0–7 is 'normal', 8–10 is borderline and 11+ represents a 'case' of psychological morbidity. It was found that, for the anxiety scores, 58% met criterion for normal levels, 14% for borderline levels, and 28% for psychological morbidity. The respective figures for depression were 85%, 8% and 7%.

3.3. Correlational analyses

After applying a Bonferroni correction and employing a significance level set at $\alpha' = .01(.05/4)$, there was no correlation between any VISQ factors and age, $rs = .02$ to $-.13$, all p's > .01. A non-parametric Mann–Whitney test found no difference between men and women on the subscales of the VISQ, $t(218) = .07$ to $-.93$, all p's > .01. The frequency of scores on individual items making up each subscale are shown in Table 3. An examination of all responses to items on each subscale showed that 36.1% of participants reported some experience of Condensed Inner Speech, 77.2% reported some Dialogic Inner Speech, 25.8% reported some Other People in Inner Speech, and 82.5% reported some Evaluative/Motivational Inner Speech.

Table 4
Bivariate and partial correlations among variables.

	Condensed Inner Speech	Dialogic Inner Speech	Other People in Inner Speech	Evaluative/ Motivational Inner Speech	AHs[a]	VHs	HADS:Anxiety[b]	HADS: Depression[c]
Condensed Inner Speech	1	−.10	.11	−.13	.05 (−.01)	.06	.07 (−.03)	.18 (.17)
Dialogic Inner Speech	–	1	.30*	.50*	.32* (.26*)	.19	.23* (.21)	.10 (−.03)
Other People in Inner Speech	–	–	1	.34*	.31* (.20)	.23*	.35* (.27*)	.25* (.09)
Evaluative/Motivational Inner Speech	–	–	–	1	.29* (.18)	.20	.35* (.26*)	.27* (.11)
Auditory hallucinations (AHs)	–	–	–	–	1	.20	.30*	.30*
Visual hallucinations/ disturbances (VHs)	–	–	–	–	–	1	.22*	.04
HADS: Anxiety	–	–	–	–	–	–	1	.51*
HADS: Depression	–	–	–	–	–	–	–	1

* $p < .001$ (i.e., =.05/28).
[a] Partial correlations are after controlling for age, visual hallucinations, anxiety and depression.
[b] Partial correlations are after controlling for depression.
[c] Partial correlations are after controlling for anxiety.

3.4. VISQ, anxiety, and depression

Bivariate and partial correlations among the variables under investigation are presented in Table 4. To assess the unique relation among anxiety, depression, and the VISQ, partial correlations between the VISQ subscales and depression, whilst controlling for anxiety, were first examined. As can be seen in Table 4, no significant correlations were found. When partial correlations between the VISQ subscales and anxiety, controlling for depression, were examined, anxiety correlated positively with both the Evaluative/Motivational Inner Speech and Other People in Inner Speech subscales (Table 4). All correlations between VISQ subscales and both age and gender were non-significant after a Bonferroni correction had been applied and alpha set at $\alpha' = .006$.

3.5. VISQ and proneness to auditory and visual hallucinations

In order to ensure that the auditory and visual hallucination-proneness scales were independent constructs, an EFA using principle components analysis with oblique rotation (direct oblimin) was performed using the nine hallucination items. Scree-plot inspection, Kaiser's rule, and parallel analysis using a Monte Carlo analysis with 1000 repetitions all suggested the extraction of two factors, with eigenvalues of 3.77 and 1.30, in total accounting for 56.34% of the variance. All five items on the proneness to auditory hallucinations scale loaded (>.6) onto Factor 1, and all four items on the proneness to visual hallucinations/disturbances scale loaded (>.6) onto Factor 2. There was no cross-loading. It was hence concluded that the two scales were distinct constructs. As shown in Table 2, both revised scales had satisfactory internal reliability.

All subscales of the VISQ, apart from Condensed Inner Speech, correlated with proneness to auditory hallucinations (Table 4). Only the Other People in Inner Speech subscale of the VISQ correlated with proneness to visual hallucinations/disturbances. To assess the unique contribution of each VISQ subscale to auditory hallucination proneness, a hierarchical multiple linear regression (MLR) was performed with proneness to auditory hallucinations as the dependent variable. Age, gender, anxiety, depression, and proneness to visual hallucinations were entered in the first step, and the four subscales of the VISQ in a second step. The assumption of normality of residuals, assessed using Kolmogorov–Smirnov (K–S) test, was met, $D = .05$, $p > .05$, and there was no evidence of multicollinearity in the data. The first step, $F(5,214) = 10.91$, $p < .001$, second step, $\Delta R^2 = .07$, $\Delta F(4,210) = 4.78$, $p = .001$, and the final model, $F(9,210) = 8.62$, $p < .001$, were all significant. In the final model, age, $\beta = -.23$, $p < .001$, depression, $\beta = .17$, $p < .05$, and the Dialogic subscale of the VISQ, $\beta = .19$, $p < .01$, were significant predictors of proneness to auditory hallucinations.

In order to test specificity, the MLR was then re-performed with proneness to visual hallucinations as the dependent variable, with the addition of proneness to auditory hallucinations to the variables controlled for in the first step. The first step was significant, $F(5,214) = 4.03$, $p < .01$. In this model, anxiety, $\beta = .26$, $p < .01$, and proneness to auditory hallucinations, $\beta = .17$, $p < .05$ were significant predictors. However, the second step, $\Delta R^2 = .03$, $\Delta F(4,210) = 2.02$, $p > .05$, was not significant.

4. Discussion

The present study aimed to develop a questionnaire to assess a range of qualitative and functional aspects of inner speech. The resulting Varieties of Inner Speech Questionnaire (VISQ) was shown to have a reliable four-factor structure, derived by exploratory factor analysis and confirmed by confirmatory factor analysis. The four subscales, Dialogic Inner Speech, Condensed Inner Speech, Other People in Inner Speech, and Evaluative/Motivational Inner Speech were all found to have satisfactory internal reliability and acceptable test–retest reliability. The majority of participants reported some experience of dialogic (77.2%) and evaluative/motivational inner speech (82.5%). Smaller proportions of participants reported condensed inner speech (36.1%) or other people in inner speech (25.8%). Our findings thus confirm the suggestion that there are empirically determinable individual differences in people's experiences of inner speech.

The Evaluative/Motivational and Other People subscales of the VISQ (but not the Dialogic or Condensed Inner Speech subscales) correlated positively with levels of anxiety, even when levels of depression were controlled for. None of the subscales of the VISQ correlated with depression when anxiety was controlled for. Previous research has found that rumination, a predominantly verbal process (Nolen-Hoeksema, 2004), is related to anxiety levels (Harrington & Blakenship, 2002). The present findings extend these earlier findings by demonstrating that not only is evaluation/motivation of oneself in inner speech related to anxiety, but so also is the presence of verbalizations of other people. It would be interesting to explore this association specifically in relation to social anxiety, to determine whether the presence of other voices in inner speech may contribute to this disorder. Our findings also suggest that therapeutic interventions, such as cognitive behavioral therapy, may benefit from examining whether the presence of critical statements by others, generated in inner speech, relates to anxiety, and if addressing such cognitive biases can have therapeutic benefits. However, it is important to note that, although a number of participants met criteria for psychologically morbid levels of depression or anxiety (indeed, high levels of anxiety were found in this student population, which may have been due to this study being performed in the run-up to exams), this was predominantly a non-clinical sample, and the relation between the VISQ and anxiety/depression remains to be investigated in clinical samples.

Multiple linear regression analyses, controlling for age, gender, proneness to visual hallucinations/disturbances, anxiety, and depression, found that only the Dialogic Inner Speech subscale of the VISQ predicted proneness to auditory hallucinations.

None of the VISQ subscales predicted proneness to visual hallucinations/disturbances. We found that two other factors predicted proneness to auditory hallucinations: age and depression. Our finding that, within this 18–30 year old age group, younger individuals are more prone to auditory hallucinations was consistent with previous studies (e.g., Tien, 1991). The same could not, however, be said for the observed positive relation between depression and proneness to auditory hallucinations. In particular, Morrison, Wells, and Nothard (2000) found that depression was not a predictor of proneness to auditory hallucinations. In accounting for the discrepancy between our findings and those of Morrison et al., we would note that the latter's measure of depression, which was a composite score of three 0–100 visual analogue scales assessing depressed mood, loss of interest, and lack of pleasure, was not a psychometrically validated instrument, which leaves open the possibility that our measure (taken from the HADS) was more sensitive and reliable than that used in the earlier study.

Our finding that the Evaluative/Motivational and Other People factors did not predict proneness to auditory hallucinations was surprising given that such qualities are common features of AVHs in clinical groups (Nayani & David, 1996). Additionally, our finding that levels of dialogic inner speech predicted levels of AVHs was unexpected given Langdon, Jones, Connaughton, and Fernyhough (2009) interview-based finding of a trend towards a reduction in dialogic inner speech in patients with schizophrenia with AVHs in comparison to healthy controls.

These apparent discrepancies with previous research may be accounted for by the differing phenomenology of voice-hearing experiences between clinical and nonclinical samples. Specifically, we would note phenomenological differences between the frequent and complex voices heard by individuals in clinical populations (Nayani & David, 1996) and the more sporadic, less complex voices heard by individuals in the general population (e.g., Posey & Losch, 1983).[1] Although continuum models assume that there is a "continuum of severity" in AVHs (Johns et al., 2004, p. 298), there have been no detailed studies of whether there is a corresponding "continuum of phenomenology". There is a risk of overstating the structural commonality between such experiences (hearing a voice that no one else can hear) at the cost of ignoring phenomenological differences relating to the content and form of the voice. A closer attention to phenomenology (Jones, 2010) may help us better to understand what continuities and discontinuities exist on the continuum of AVHs. If observed empirically, differences in AVH phenomenology between (or even within) populations might reflect differences in underlying causal mechanisms (see McCarthy-Jones, forthcoming). For example, whilst in the general population a greater volume of dialogic inner speech may increase the likelihood of some inner speech being experienced as alien (potentially due to source monitoring errors), in clinical populations the preponderance of dialogic inner speech may be less important in predicting AVHs than other factors, such as stress and cognitive challenge (Fernyhough, 2004).

There were a number of limitations to the present study. First, we cannot rule out the possibility that the low rate of Condensed inner speech (compared to Dialogic and Evaluative/Motivational varieties) may be an artifact of the phrasing of the questions. For example, all questions on the Dialogic subscale asked about the presence of dialogic inner speech without asking positively about the presence of monologic inner speech (for example, 'My inner speech is like a monologue'). Although this possibility could be tested in future research with the VISQ, which may lead to downward revisions of the incidence of Dialogic and Evaluative/Motivational inner speech, we note for the present that it would be difficult to define internal monolog, for example, without reference to the absence of its dialogic character, which may result in the same focusing of attention on the dialogic properties of this form of speech.

A second limitation is that individuals may have been unable, in the context of a self-report questionnaire, accurately to introspect and report on the subjective qualities of their inner speech, particularly with qualities such as condensed nature. It would therefore be desirable for future research to validate the VISQ using more ecologically valid methodologies, such as Experience Sampling Methods (ESM: Csikszentmihalyi & Larson, 1987) and Descriptive Experience Sampling (DES: Hurlburt & Heavey, 2006). In ESM participants wear beepers which sound at random intervals during the day, at which prompts participants make records of a predetermined aspect of their experience. By asking participants to make notes on aspects of inner speech assessed by the VISQ, it should be possible to determine how ESM-reported inner speech correlates with self-report responses on the VISQ.

A related limitation is that the VISQ, in its present form, does not capture certain established functions of inner speech such as self-regulatory and mnemonic functions. These functions are however assessed by existing relevant instruments, such as the STS (Burnett, 1996), which can be used to assess the affective tone of inner speech evaluations, and the SVQ (Duncan & Cheyne, 1999), which can be used for assessing overt self-regulatory private speech, and includes a subscale assessing the cognitive, mnemonic, and attentional uses of self-verbalization.

Further limitations include the fact that the correlational design of the study means that no conclusions can be drawn regarding causality or causal direction in the relation between aspects of inner speech and our psychopathology measures. Our study was performed with a very specific demographic, and future studies would benefit from replicating the present findings in the general population. Similar reasoning leads us to call for the extension of this research with a non-clinical population into patient samples, so as better to understand the links between our inner speech variables of interest and genuine psychopathology.

In conclusion, we have presented a new self-report instrument for assessing theoretically and practically important aspects of the phenomenology of inner speech. Despite the well-documented limitations of self-report measures, we propose

[1] We also note the existence of a third group of individuals, who have frequent and complex voices but do not seek psychiatric help. Such individuals have been termed "healthy voice-hearers" (Moritz & Larøi, 2008, p. 104).

that research with such instruments, backed up with more qualitative methods for describing inner experience, may lead to further progress in understanding the experience of inner speech, and its relations with psychopathological variables across clinical and nonclinical populations.

Acknowledgments

We are grateful to Drs. Rebecca Knowles and Georgina Rowse for their help supporting data collection, and to the anonymous referees of this paper for their helpful comments.

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