

How Do Distance Runners Experience Inner Speech? An Empirical Investigation

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ABSTRACT

According to what people report, inner speech is a very common experience. Cognitive science researchers have been slow to investigate the phenomenon because its non-observability makes it difficult to study. This experiment uses an experiential questionnaire method with a tightly constrained design to explore properties of inner speech that have been proposed by Lev Vygotsky. Using a sample of distance running athletes, it investigates the extent of (1) dialogue, (2) condensed syntax, (3) evaluation, and (4) auditory representations of others, in inner speech. Employing three sets of interviews with each athlete that immediately followed their participation in training and competitive running, the study finds evidence to support a Vygotskian theoretical approach to inner speech, with strong evidence for condensed syntax, dialogue and evaluation.

KEY WORDS

Inner speech, Inner experience, Vygotsky, dialogue, evaluation, condensed syntax, auditory representations, self talk, distance running athletes

INTRODUCTION

Inner speech, the subjective experience of talking to oneself without the utterance of sound, is both a prominent feature of many people's inner experience and plays an important role in regulating aspects our behaviour. Within cognitive science, methodological concerns regarding the ability to systematically capture and isolate the phenomenon for study, and the reliance on the reporting of the subject's own experience in the collection of data for use in its study, has meant that inner speech has received relatively little attention from researchers. Yet with the array of cognitive functions and the crucial developmental role proposed for inner speech, there is an obligation to establish a sounder empirical footing, notwithstanding methodological concerns. The most well understood cognitive function of inner speech is that of verbal rehearsal (Baddeley, 1992), while there is much evidence to support the reliance on inner speech for task-switching (Emerson & Miyake, 2003), false belief reasoning (Newton & DeVilliers, 2007) and silent reading (Perrone-Bertolotti et al,

2014). Further evidence suggests a role for, if not reliance on, inner speech in planning (Williams et al, 2012), logical reasoning (Gilhooly, 2005) and categorisation (Lupyan, 2009).

The work of Vygotsky (1934 / 1987) has been influential in reevaluating the importance of inner speech for developmental cognition. Vygotsky theorised inner speech to be the maturation of a developmental process where social interaction, mediated through language, is internalised and transformed into a form of verbal thinking. Vygotsky made a number of claims about the inherent properties of inner speech. This study empirically investigates some of these properties in a sample of a specific population, amateur distance runners. In particular, the study explores the following:

Inner speech as dialogic. Dialogue here means the presence of more than one perspective in relation to the matter under consideration in inner speech. It can be characterised as an internal conversation where different viewpoints are being aired, an interplay between different internalised perspectives. It does not necessarily imply that a full-blooded auditory-verbal representation of a speaker other than the subjects' is present. Fernyhough (2004) has argued that inner speech is inherently dialogic, arising from its origin in social interaction and subsequent internalization, and that such dialogue would be "shot through with voices". Bakhtin, a contemporary of Vygotsky, argued that internal dialogue is "not a polyphony of reconciled voices but a polyphony of battling and internally divided voices" (Tovares, 2010, pp263).

Condensed syntax and semantics in inner speech. Vygotsky theorised that through the internalisation of social speech to inner speech, a transformation occurs where the language of inner speech becomes abbreviated, syntactically condensed. From a semantic perspective, Vygotsky argued that in the transformation to inner speech, conventional, public meaning of words lose salience, as "sense" becomes prominent, where sense means multiple private meanings. To take an example from the questionnaire this study uses, runners may use the word "kick" rather than "I need to kick at the finish", where "kick" may adopt multiple referents, such as anxiety about finishing time, concern about current performance, hopes for their finishing place in the race, rather than simply referring to a desire to increase running speed. It is this syntactic and semantic transformation in the internalisation of inner speech that differentiates it from external speech "with the volume turned down". Evidence for this altered form, a condensed inner speech, would strongly support a Vygotskian view. While the condensation of syntax is within the scope of this study, the semantic corollary is not.

Evaluation. The evaluation of other people and of oneself has been proposed be a function of inner speech. Morin & Michaud (2007) studied the role of inner speech self-evaluation and self-reflection. Hardy, Hall & Hardy (2005) argued that evaluation in inner speech plays an important role in motivation to athletic achievement, and as the subjects of this study are distance runners, it is useful to test for the presence of such evaluation. Evidence for evaluation may be construed as indirect evidence of dialogue. Vocate (1994) argues that evaluation requires people to have a degree of detachment from their own experiences, and as such, an ancillary perspective on those experiences, characteristic of dialogue.

Other people. Fernyhough (1996) has argued that within a Vygotskian view of dialogic inner speech, the multiple perspectives to the dialogue may be "voiced", an auditory-articulatory representation of voices in inner speech other than one's own. The question here is whether the multiple perspectives that is characterised in this paper as dialogue have discrete auditory representations. For example, as the athlete tires near the end of the race, conflicting perspectives, between wanting to finish as fast as possible and wanting to

slow or stop due to fatigue, will often arise. The question under investigation is whether these conflicting internal perspectives are separately “voiced”. While there is no evidence that Vygotsky viewed the auditory representation of the voices (other than one’s own) as a necessary or even typical outcome of the maturation of inner speech, it is often viewed as a building block for developing cognitive theories of auditory verbal hallucinations and the phenomenology of psychosis (Cho & Wu, 2013). Certainly there is evidence that people do experience auditory representations of the voices of others in silent reading (Alexander & Nygaard, 2008).

Self-talk in athletes

This study explores inner speech in competitive amateur distance runners. It is not focused on any performance effects, but instead investigates whether the inner speech of such athletes reflects a Vygotskian view. Distance running is an endurance sport performed individually where the athlete is relatively isolated for prolonged periods. Athletes and coaches participating in sports such as distance running view inner speech, often termed self-talk in the literature of sports psychology, as having a material impact on athletic performance. While there are numerous studies of self-talk in athletes that investigate performance effects, they are typically beset with both theoretical and methodological problems. Hatzigeorgiadis et al (2004) characterise self-talk in athletes as a cognitive strategy designed to improve performance. The concept of inner speech as a cognitive strategy implies that the athlete has volitional control over their verbal thinking, that it is within their gift to consciously create and edit its content. No account is offered for this characterisation, and if inner speech ontogenetically arises from social interaction as Vygotsky theorised, such a contrary characterisation as this warrants a more detailed explanation. Weinberg (1988) focuses on the valence of the content of inner speech, describing positive self-talk as that which helps the athlete to stay focused, not dwell on past mistakes or project far in the future. Yet this valence based approach engages in circular reasoning: the effects referred to can only be known after the event, and allows no way to understand the valence of particular contents of inner speech at the moment of articulation. If telling myself that I’m doing terribly in a particular event has the effect of improving my performance, then by this approach, that is positively valenced self-talk.

There are also methodological concerns regarding studies in the literature that rely on highly controlled laboratory conditions in the study of self-talk in athletes. Theodorakis et al (2000) assigned subjects in a variety of sports specific phrases to use, such as “do your best” or “I can”, in the performance of laboratory-controlled tasks. For example, youth soccer players were tested in ball-passing performance, adult badminton players in single serves, and school children in the performance of “sit-ups”. The results support their hypothesis that positively valenced self-talk has a positive performance effect. However, the non-naturalistic experiment design, which seeks to isolate one particular aspect of the sport and does so outside a sporting competitive environment, may not be replicable in a more meaningful environment. Harvey, Van Raalte & Brewster (2002) adopted a similar experimenter controlled design with a sample group of golfers, as did Van Raalte et al (1995) with darts players and tennis players (Van Raalte et al, 2000).

The design of the present study sought to investigate inner speech in the runners’ own environment, with interviews taking place directly after an athlete’s normal training exercise (phase 2) or competitive running event (phase 3). In doing so, we hoped to capture aspects of their inner speech in a naturalistic manner. Empirical studies investigating the phenomenology of inner speech suggest that most people engage in inner speech (Heavey & Hurlburt, 2010) and that at random interventions any one person may be engaged in

inner speech 25% of the time (Hurlburt et al, 2013). The conditions under which distance runners normally perform were thought likely to be suitable for the investigation of inner speech.

A note on methodology

The methodology is based on a modified version of the Varieties in Inner Speech Questionnaire (VISQ) developed by McCarty-Jones & Fernyhough (2011).

VISQ has been employed with subjects from either the general population using online responses (McCarty-Jones & Fernyhough, 2011), or to investigate links between inner speech and psychopathological variables in young adults (Alderson-Day et al, 2014). Hurlburt et al (2013) are critical of questionnaire approaches to inner experience, and specifically criticise the VISQ methodology because people are either not aware of, or are unreliable reporters of, their own experience. They acknowledge that this limitation may be overcome through an iterative process of training, where subjects are provided with phenomenological training that improves subject's introspective skills and provides a route to better understand the questions being asked of them. Petitmangin (2006) notes one of the crucial challenges of this type of methodology, which requires subjects to grow awareness of their own subjective experience, is that it is "very hard to stabilise our attention". Attention is a very limited resource that can be easily diverted by both exogenous and endogenous stimuli. She observes that it is helpful to the goal of stabilising the subject's attention to the locus of enquiry through having both the physical presence of the interviewer, as a reminder of the specific objective of the interview, and the regular reformulation of the subject matter to regularly refocus attention.

In this study, all interviews were conducted in person by the same interviewer, and on each occasion the same process was repeated: the interviewer approached the participant immediately following their athletic performance, asked that they reflect on their inner experience during the performance before proceeding with the questions. Each subject was interviewed on three occasions, so that the aggregated impact was the participant had a stronger understanding of the interview goal at each iteration. The questions and format of the interview remained the same, so that subjects were given a greater opportunity to familiarise themselves with what was being asked of them. Indeed the anecdotal feedback reported from subjects was a better appreciation of their own introspections on the matter. Through iteration, subjects sought to clarify what the intention of a specific question was ("you mean specific to the run I just did, rather than in general"?). The study sought to constrain the elicitation of responses to questions under these strictly controlled conditions, so that while the setting was perfectly normal for the participant, data was collected in a highly consistent manner. The intention in designing the experiment in this way was to balance the tension between the ecological validity of the experiment, ensuring that the data reflects the normal or typical experience of the participant, and the experimental control exerted so that the data is collected in a consistent systematic manner to afford valid comparison of results across subjects. There is no epistemically optimal way to balance these divergent objectives, but the intention of the design was to recognise both, without attempting to reconcile them.

METHOD

Participants

13 competitive amateur distance runners were recruited from a Dublin running club to take part in the study. Of the 13, 10 were male, and the mean age was 31.27 and the age range was 18 to 55. Participants were recruited through a formal approach to their running club. Two participants did not complete all phases and their results were discarded. No financial incentives were provided and informed consent was sought and received from each individual. All information provided has been anonymised. Ethical exemption was obtained from University College Dublin's Ethics Committee.

Procedure

The study employs a modified version of the Varieties of Inner Speech Questionnaire (VISQ) (McCarthy-Jones & Fernyhough, 2011). The questionnaire contains 16 items. Four questions are intending to examine each of the aspects of inner speech proposed in the study. The questionnaire was scaled to 6 points, as follows: Certainly applies to me (1), Possibly applies to me (2), If anything slightly does (3), if anything slightly doesn't (4), Possibly doesn't apply to me (5), Certainly does not apply to me (6). The 16 questions were grouped into 4 aspects of inner speech that the study was interested in. These were:

- Condensed: The extent to which participants experienced inner speech with compressed syntax. ("My thinking is shortened compared to my normal out loud speech. For example, rather than saying "I need to kick at near the finish", I just say "kick"")
- Dialogicality: The extent to which participants experienced inner speech as dialogic, of the quality of there being more than one perspective at play on the matter they were attending to in inner speech. ("I think to myself about things on my mind, it is like having a conversation with myself")
- Evaluation: The extent to which participants experienced inner speech as having a quality of evaluation, self-instruction or motivation. ("I think to myself about what I have done and whether it was right or not")
- The presence of the voices of others: The extent to which participants experienced an auditory representation of a voice (or voices) other than their own in their inner speech. ("I hear other peoples voices nagging in my head, for example a coach")

Each participant was interviewed on three separate occasions, and the study took the form of three discrete phases.

Phase 1: Participants were initially briefed about the nature of the study and then asked to perform a standard behavioural task, the Tower of Hanoi. Participants were advised that they would be asked about aspects of their inner experience following completion of the task. After this, participants were posed a series of questions. The intention of this phase was to introduce participants to the study and its process, and to stabilise their understanding of the aspect of inner experience that the study was investigating.

Phase 2: Immediately following a normal intense training session that they performed, participants were approached and asked the same set of interview questions as outlined in phase 1 above.

Phase 3: Immediately following a competitive run that they perform, participants will be approached and asked the same set of interview questions as outlined in phase 1 above.

RESULTS

Descriptive statistics by Phase:

Table 1

Variable	Mean	SD	Var	Min	Q1	Median	Q3	Max	IQR
Condensed	3.00	1.14	1.30	2.0	2.25	2.50	3.25	5.50	1.00
Dialogue	2.84	1.59	2.53	1.0	1.75	2.25	4.50	5.25	2.75
Evaluative	2.88	1.28	1.64	1.5	1.50	2.25	4.00	5.00	2.50
Other people	5.72	0.90	0.82	3.0	6.00	6.00	6.00	6.00	0.00

**Note: that a six point Likert scale was used, where 1 represents “certainly applies to me”, and 6 represents “certainly does not apply to me”.*

Table 1 shows descriptive statistics for phase 1 for the four dimensions examined in the questionnaire. Mean and median scores were highest for the presence of dialogue and evaluation in inner speech, with condensed inner speech showing similar average scores. The measures indicate little evidence for the presence of other people, the auditory representation of voices other than one’s own.

Table 2

Variable	Mean	SD	Var	Min	Q1	Median	Q3	Max	IQR
Condensed	1.98	1.45	2.11	1.0	1.00	1.25	2.50	5.75	1.50
Dialogue	2.82	0.94	0.88	1.25	2.00	2.75	3.50	4.50	1.50
Evaluative	2.14	0.96	0.92	1.00	1.25	2.25	2.75	4.00	1.50
Other people	5.43	0.88	0.78	3.75	5.25	6.00	6.00	6.00	0.75

Table 2 displays the same statistical analysis for phase 2. Overall pattern is similar to phase 1, with evidence for three dimensions, evaluation, dialogue and condensed inner speech, while little support for the presence of other people. However, there are some notable changes relative to phase 1:

I. Condensed inner speech is materially stronger; the mean score has reduced from 3 to under 2, while the median score has changed from 2.5 to 1.5. This indicates more evidence of condensed inner speech in the first running phase relative to the initial phase employing the tower of Hanoi task.

II. With respect to dialogue, the mean score was marginally reduced while the median score was higher (indicating weaker evidence), moving from 2.25 to 2.75, while standard deviation from the mean was lower.

III. For evaluation, the mean score reduced from 2.88 to 2.14 while the median was unchanged.

Table 3

Variable	Mean	SD	Var	Min	Q1	Median	Q3	Max	IQR
Condensed	2.05	1.17	1.36	1.00	1.00	1.75	2.75	4.75	1.75
Dialogue	3.61	1.39	1.94	1.00	2.25	4.00	4.75	5.50	2.50
Evaluative	2.16	1.38	1.89	1.00	1.00	2.00	3.00	5.00	2.00
Other people	5.32	1.25	1.55	2.75	5.00	6.00	6.00	6.00	1.00

Table 3 shows the same analysis for phase 3. In this phase participants were responding following a competitive run. Once again there is little evidence for the presence of other people in participants inner speech. With respect to the other dimensions:

I. Condensed inner speech is stable relative to phase 2. Mean scores remained at approximately 2 while the median increased from 1.5 to 1.75, and the standard deviation from the mean reduced from 1.45 to 1.15.

II. Evidence for dialogue is significantly lower for the competitive running phase. The mean increased to 3.61 (2.81 in phase 2), and the median increased to 4 (2.75 in phase 2).

III. Evaluation. Little change in the mean score relative to phase 2, while the median reduced from 2.25 to 2. In addition, the standard deviation increased from 0.96 to 1.38.

Table 4

Question item
I think to myself in brief phrases & words rather than full sentences
I think to myself in words using full sentences
My thinking is shortened compared to my normal outloud speech. For example, rather than saying "I need to kick at the finish", I will just say "kick" in my mind.
My thinking to myself in words is like shorthand notes rather than full grammatical sentences
It is like going back and forth asking questions and responding
My thinking in words is like a dialogue with myself, rather than a monologue of my own thoughts
I think to myself about things on my mind, it is like having a conversation with myself
I talk back and forth about things on my mind
I evaluate my behaviour, telling myself "that was good" or "that was stupid"
I think to myself about what I have done and whether it was right or not
I talk to myself silently telling myself to do things
I talk to myself silently telling myself not to do things

I experience the voices of other people asking me questions in my mind
I experience the voice of another person in my head. For example when I do something wrong a voice other than mine admonishes me
I hear other peoples voices nagging in my head, for example a coach
I hear other peoples actual voices in my head saying things that they actually once said to me

Table 4 contains the individual items in the questionnaire. The table sequences the items in accordance with issues the study looks to explore. For each phase, the question was prefaced with the activity of that phase, so that for phase one, the item begins “During this exercise...” and for items two and three, “When running...”. A question arises as to whether the items grouped under a particular issue actually reflect an approximation of that issue. The individual items have been included for that purpose. The questions items have been adopted from McCarthy-Jones & Fernyhough (2011) and modified to take account of the particular activities of the participants, distance running. The mapping from individual questions posed to the issue of interest is intended to be clear. As an example, the first four questions above are grouped under condensed syntax. One of the items states: “my thinking is shortened compared to my normal out loud speech. For example, rather than saying "I need to kick at the finish", I will just say "kick" in my mind”. Respondents are being asked about how their inner speech compares to normal speech with respect to the question abbreviation.

DISCUSSION

The aim of this study was to explore the experience of inner speech among a sample of distance runners, seeking evidence to support a Vygotskian conception of the phenomenon. In particular, it sought to investigate whether participants’ phenomenology of their inner speech contained:

Condensed syntactical structure. Based on the questions responded to, the results provide support for condensation within their inner speech. For the aggregate of all phases, approximately 50% indicated that the items measuring this proposed property “certainly applies to me”. Looking by phase, the mean scores indicate the participants reported greater condensation in the two athletic phases, two and three, relative to the first phase. This may be attributable to a genuine effect; that with greater physical exertion there is a greater likelihood of abbreviating syntax in inner speech. An alternative explanation is that it may arise because participant’s introspection skills have been honed through partaking in the initial phase and thereafter become better able to identify condensed syntax. A study design that contained additional phases that further controlled for athletic exertion may disambiguate between the relative impact of greater introspective abilities and athletic exertion in the abbreviation of syntax in inner speech.

Dialogue. While the results provide some evidence of dialogicality in inner speech in participants’ inner speech for all phases, it is weaker by comparison with condensed syntax. What is most striking about the results is the change between phases. Mean scores for the initial phases one and two are both approximately 2.8 (median scores of 2.25 and 2.75 respectively), for phase three this is 3.6 for mean and 4.0 for median. It seems reasonable to infer from this that while participants experience a dialogic quality to their inner speech, this recedes significantly in the competitive phase, so that at higher physical exertion, the verbal quality of their thinking changes to a single perspective.

Evaluation. While evaluation is weakly positive in the first phase (2.8 mean, 2.25 median), the following phases show a significant increase in evaluation (2.1 mean for both, 2.25 and 2 median respectively). This is the opposite trend to dialogue. This may be interpreted as supporting the idea of evaluation, judging at a remove, as a type of dialogue, in the sense of alternative perspective on the issue under consideration in inner speech. It is also worth noting the difference in scoring between two questions grouped under evaluation. Results for the item “I talk to myself silently telling myself to do things” are broadly similar to the other two items in evaluation, with 60% responding that “it certainly applies to me” for all phases. For the item “I talk to myself silently telling myself not do things”, this changes to 24%. While it is not clear why two such similar items should produce such different results, it may hint at how respondents were more reluctant in disclosing evaluations constructed in the negative rather the positive.

Presence of other people. There is a consistent outcome for items grouped under other people, which here means an auditory-articulatory representation of voices other than one’s own: little evidence from respondent in any of the phases. “Certainly does not apply to me” was by far the most numerous response. However, a small minority of participants indicated the presence of other voices. Given the small sample size, this is noteworthy. Working with a much larger sample (N=235), McCarthy-Jones & Fernyhough (2011) found 7.5% of respondents indicated “certainly applies to me” to this group of questions. It is also plausible that this effect is underrepresented in such a methodology, as the sensitivity of the question and historical public perception of such experiences may mean people are reluctant to disclose their experiences of auditory representations of other people. However based on these results, evidence for dialogicality in inner speech but not for other people suggests that different “voicing” of parties to the dialogue of inner speech is not typical.

Overall, the study supports a Vygotskian conception of inner speech, with evidence for condensed syntax, evaluation and dialogicality in the experience of inner speech in the sample group of participants. As noted in the introduction, methodological concerns regarding the ability to reliably capture inner speech has led to insufficient attention being paid to the phenomenon. Care has been taken in the design of this study so that these concerns are addressed. Through using as naturalistic a setting as is feasible, a consistent process for interview, a constraining approach to the method by which the data collected, and three separate interviews with each participant, the design balances the tension between ecological validity and experimental control so that the results are a meaningful contribution to the study of inner speech.

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