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'What's in a name?' 'No more than when it's mine own'. Evidence from auditory oddball distraction

Jessica K. Ljungberg [a,b,*], Fabrice B.R. Parmentier [c,d], Dylan M. Jones [b,d], Erik Marsja [a], Gregory Neely [a]

[a] Department of Psychology, Umeå University, Umeå, Sweden
[b] School of Psychology, Cardiff University, UK
[c] Department of Psychology, University of the Balearic Islands, Spain
[d] School of Psychology, University of Western Australia, Australia

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ABSTRACT

Research of the distractor value of hearing the own name has shown that this self-referring stimulus captures attention in an involuntary fashion and create distraction. The behavioral studies are few and the outcomes are not always clear cut. In this study the distraction by own name compared to a control name was investigated by using a cross-modal oddball task in two experiments. In the first experiment, thirty-nine participants were conducting a computerized categorization task while exposed to, to-be ignored own and matched control names (controlling for familiarity, gender and number of syllables) as unexpected auditory deviant stimulus (12.5% trials for each name category) and a sine wave tone as a standard stimulus (75% of the trials). In the second experiment, another group of thirty-nine participants completed the same task but with the additional deviant stimulus of an irrelevant word added (10% trials for each deviant type and 70% trials with the standard stimulus). Results showed deviant distraction by exposure to both the irrelevant word, own and the control name compared to the standard tone but no differences were found showing that the own name captured attention and distracted the participants more than an irrelevant word or a control name. The results elucidate the role of the own name as a potent auditory distractor and possible limitations with its theoretical significance for general theories of attention are discussed.

1. Introduction

There is undoubted advantage to be being able to filter out auditory distractors. At the same time, the detection of unexpected spoken messages, potentially conveying information of relevance outside the task at hand, is an adaptive capability of our cognitive system. Indeed, studies have suggested that auditory information of personal salience is especially prone to capture attention in an automatic fashion (Treisman, 1960). In an early and much cited study Moray (1959) used the dichotic listening paradigm in which participants who shadowed a verbal message in one ear detected the presentation of their own name in the to-be-ignored ear. This was taken to show that one's own name captures attention even if part of an unattended auditory stream. In the intervening years Moray's study has been cited frequently, but at the same time the shortcomings of the method have been less widely acknowledged. Among what today would be regarded as major shortcomings are the fact that the to-be-ignored messages were passages with instructions to the participants (e.g. John Smith you may stop now), that the presentations of each name were in most cases cued in advance of its occurrence, that the outcome was based on a recognition task (not a direct measure of detection of presence in the passage), and only four participants out of twelve reported hearing their own name in the unattended channel. It is of course possible that one's own name constitutes a highly primed and salient stimulus given its ubiquity over the individual's life span. Given these misgivings with the original study and others undertaken since, this study re-examines this classical finding using rigorous behavioral methods.

Certainly, it has to be acknowledged that contemporary work using different methods — including Event-Related Potentials (ERP) and functional magnetic resonance (fMRI) — have appeared to support the original finding by showing the potency of the person's name in capturing attention (e.g., Carmody & Lewis, 2006; Eichenlaub, Ruby, & Morlet, 2012; Holeckova, Fischer, Giard, Delpuech, & Morlet, 2006; Ofek & Pratt, 2005; Perrin et al., 2005). Typically such studies show that the own name is processed differently compared to other unexpected sounds (e.g., a control name, burst of noise, or the own name uttered by an unfamiliar voice). Indeed, one's own name is conferred a special status by the finding that participants' own name elicits similar brain responses during both sleep and awake periods (Perrin, Garcia-Larrea, Mauguiere, & Bastuji, 1999).

At the same time it has to be acknowledged that the effect of one's own name on ongoing performance is not as clear-cut as suggested in

* Corresponding author at: Department of Psychology, Umeå University, SE- 90187, Umeå, Sweden. Tel.: +46 90 786 97 07.
E-mail address: jessica.korningljungberg@psy.umu.se (J.K. Ljungberg).

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most classical accounts. Wood and Cowan (1995) replicated Moray's study by using a dichotic listening task, but with a better methodology. Among other changes, they used two different voices in the shadowed and unattended ear to enable easier partitioning of the two auditory channels and had a larger study sample. Their findings were similar to those of Moray's, showing that about 34% ($N = 9$) of the participants asked to shadow messages (unrelated monosyllabic English words spoken with the rate of 1/s) to one ear reported hearing their own name in the other, unattended, ear and exhibited more shadowing errors and longer response lags on the two words following the presentation of their own name. No participant reported or showed any response lags following the presentation of a yoked name in the irrelevant message. The authors concluded that one's own name distracted participants by recruiting attentional resources. One may argue that an effect affecting 34% or participants may constitute weak evidence of the special status of one's own name especially considering that the name was presented only once in the unattended material. In fact, the effect is weaker still in participants with high working memory capacity and appears to affect mostly those with low working memory capacity (Conway, Cowan, & Bunting, 2001), a difference attributed to the better inhibitory processes of the first group relative to the second. It is however unclear how the yoked names were matched in terms of familiarity or gender, in both the study by Wood and Cowan (1995) and that of Conway et al. (2001). Other studies in the area also lack control names (Harris & Pashler, 2004; Harris, Pashler, & Coburn, 2004; Mack, Pappas, Silverman, & Gay, 2002; Moray, 1959; Shelley-Tremblay & Mack, 1999). Appropriately, some studies stress the importance of having an adequate control condition when studying the attention grabbing power of personal significant stimuli (e.g., Devue & Brédart, 2008). Methodology must be designed with the key question in mind: Does the own name captures attention because it is a name or because it has a self-salience?

Not many auditory behavioral studies have used an own-name distractor, however a number of them are to be found using the visual modality. Several of these have not been able to draw any firm conclusions about the distractibility of own names (e.g., Bundesen, Kyllinsbaek, Houmann, & Jensen, 1997; Harris et al., 2004); while others have questioned the generality of the own-name effect (Harris & Pashler, 2004; Wolford & Morrison, 1980) or found it to be limited to when the own name is the focus of attention or when participants are set to identify it (Breska, Israel, Maoz, Cohen, & Ben-Shakhar, 2011; Gronau, Cohen, & Ben-Shakhar, 2003; Kawahara & Yamada, 2004).

The generalizability of the own name effect must be called into question given that it might be only a transient, surprise effect (e.g., Harris & Pashler, 2004; Wolford & Morrison, 1980), that would go unnoticed unless presented in the focus of attention (e.g., Breska et al., 2011; Kawahara, 2002) or when task load is low (e.g., Harris & Pashler, 2004), and then only when presented within the same modality as the target. If a spoken own name truly is special and potent in capturing attention from a task at hand, then its effect should be detectable in tasks other than dichotic listening tasks, and presumably in a task in which participants are instructed to entirely ignore the auditory modality. We conclude that the generality of the own name effect should be regarded with more circumspection, particularly in the contemporary literature. Studies citing the classical work by Moray (1959) rarely voice misgivings about the methodology along with the variation of this effect shown in different contexts (task demands, focus of attention and so forth).

With these qualifications in mind, we chose for our study a well-documented task designed to measure the involuntary capture of attention by unexpected auditory stimuli and its distractive impact on behavioral performance: the cross-modal oddball task. In this task, participants categorize visual stimuli, each preceded by a task-irrelevant auditory distractor that they are instructed to ignore (e.g., Berti, 2012; Ljungberg & Parmentier, 2012a, b; Ljungberg, Parmentier, Leiva, & Vega, 2012; Parmentier, Elsley, Andrés, & Barceló, 2011; Parmentier, Ljungberg, Elsley, & Lindkvist, 2011; Parmentier, Turner, & Elsley, 2011). On most trials the same auditory distractor is presented (referred to as the *standard* sound). On rare and unpredictable trials, this standard sound is replaced by another sound, referred to as the *deviant* sound when used on multiple occasions across the task or *novel* sound whenever changing across the task.

Electrophysiological measures of this type of task have demonstrated consistently specific brain activity associated with deviant and novel sounds, reflecting the detection of change in the auditory stream and the automatic orienting of attention toward it (e.g., Berti, 2012; Berti & Schröger, 2001; Escera, Alho, Winkler, & Näätänen, 1998). Behaviorally, cross-modal oddball studies show that deviant sounds delay responses to the upcoming visual stimulus (e.g., Parmentier, 2008; Parmentier, Elford, Escera, Andrés, & San Miguel, 2008). This effect is thought to reflect the time penalty associated with the orientation of attention to and from the auditory modality and the deviant or novel sound (Parmentier et al., 2008) and occurs for auditory distracters violating the cognitive system's implicit expectations (Parmentier, Elsley, et al., 2011; Parmentier, Ljungberg, et al., 2011; Parmentier, Turner, et al., 2011). Distraction occurs if the deviant consists of a burst of noise against repeatedly presented standard sinewave tones or a spoken word. The oddball task is particularly well suited to investigate whether one's own name captures attention to a special extent. First, in contrast to the dichotic listening task where one's own name is typically only presented once in an experimental session, the oddball task is arguably more sensitive as it allows the measurement of performance in a visual task in a large number of trials involving deviant sounds. Importantly, evidence shows that distraction is enduring and remains measurable after extended practice (Parmentier, 2008). Secondly, distraction has been reliably measured in the oddball task both with verbal (e.g., Ljungberg & Parmentier, 2012a) and non-verbal sounds (e.g., Parmentier, Elsley, et al., 2011; Parmentier, Ljungberg, et al., 2011; Parmentier, Turner, et al., 2011), testifying to the task's validity to measure fundamental attention capture mechanisms. Additionally, as pointed out earlier, in the cross-modal oddball task participants are instructed to ignore the auditory modality altogether, in contrast with dichotic listening tasks in which participants are asked to attend to the auditory modality (albeit with the instruction to attend one channel and ignore another).

We began by carrying out an experiment using the cross-modal oddball task in which the deviant sounds consisted of the participant's own name or another name, relatively unfamiliar name matched in gender and number of syllables. Two sets of hypotheses were contrasted. If one's own name is especially potent in capturing attention and distracting participants from an on-going task (e.g., Moray, 1959; Wood & Cowan, 1995); then deviance distraction should be significantly greater for own names than control names. If, on the other hand, own names do not constitute a special class of distractor, similar levels of deviance distraction should be observed for own names and control names.

2. Experiment 1

2.1. Methods

2.1.1. Participants

Thirty-nine student participants (16 women) from Umeå University took part in this experiment in exchange for a small honorarium. Participants' age ranged between 18 and 30 ($M = 23.66$, $SD = 3.14$), and all reported normal or corrected-to-normal vision and normal hearing, and were naïve to the purpose of the experiment.

2.1.2. Stimuli, design and procedure

Seventy-eight first names were recorded, two for every participant: their own name and one relatively unfamiliar (control name). These names were selected from a pre-experiment screening in which