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Short Communication

Can expectation enhance response to suggestion? De-automatization illuminates a conundrum

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ABSTRACT

Disparate theoretical viewpoints construe hypnotic suggestibility either as a stable trait, largely determined by underlying cognitive aptitude, or as a flexible skill amenable to attitudinal factors including beliefs and expectations. Circumscribed findings support both views. The present study attempted to consolidate these orthogonal perspectives through the lens of expectancy modification. We surreptitiously controlled light and sound stimuli to convince participants that they were responding strongly to hypnotic suggestions for visual and auditory hallucinations. Extending our previous findings, we indexed hypnotic suggestibility by de-automatizing an involuntary audiovisual phenomenon—the McGurk effect. Here we show that, regardless of expectancy modification, the experimental procedure led to heightened expectations concerning future hypnotic response. We found little effect of expectation, however, on actual response to suggestion. Our findings intimate that, at least in the present experimental context, expectation hardly correlates with—and is unlikely to be a primary determinant of—high hypnotic suggestibility.

1. Introduction

Researchers and clinicians have amassed compelling evidence detailing the effects of beliefs and expectations on a spectrum of mind and body processes (for reviews see Kirsch, 1985, 1997). Findings dating back more than two decades indicate that the effects of expectation may extend to hypnotic suggestibility (HS)—the ability to comply with or act on suggestion as a function of hypnosis. The modification of expectation led to increased scores of HS (Wickless & Kirsch, 1989), a result subsequently confirmed in the same laboratory (Kirsch, Wickless, & Moffitt, 1999). Two more recent studies, however, assert that expectation alone is unlikely a primary determinant of HS (Benham, Bowers, Nash, & Muenchen, 1998; Benham, Woody, Wilson, & Nash, 2006). Instead, these latter findings propose that a stable cognitive trait accounts for most of the variance in individual responsiveness to suggestion (Benham et al., 2006). Collectively, therefore, these mixed accounts form a conundrum: to what extent does expectation shape HS? Incorporating methodologies from the two abovementioned research groups, the present study harnessed the de-automatization of speech perception to illuminate the influence of expectancy modification on HS.

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1.1. Aptitude- and attitude-centered theories of hypnotic suggestibility

The role of expectation in HS is a topic of ongoing debate among researchers. Two major thrusts pervade the literature, falling under many labels including aptitude- and attitude-centered theories of HS (for a review see Benham et al., 2006).

Aptitude-centered theories construe HS as a stable trait molded by an underlying cognitive capacity. Findings demonstrating strong test–retest reliability of HS support this view (Piccione, Hilgard, & Zimbardo, 1989). In addition, studies intimate a neural (e.g., Graffin, Ray, & Lundy, 1995; Horton, Crawford, Harrington, & Downs, 2004), cognitive (e.g., Dixon & Laurence, 1992; Tellegen & Atkinson, 1974; Terhune, Cardeña, & Lingdren, 2011) and genetic (e.g., Raz, Fan, & Posner, 2006) basis for individual differences in HS. Despite such evidence, the exact characterization of this putative cognitive makeup remains elusive. Aptitude-centered theories acknowledge a moderate correlation between initial expectations and subsequent hypnotic response, but generally accredit little importance to expectations, attitudes, and beliefs (Kihlstrom, 2003).

Attitude-centered theories, on the other hand, view social-cognitive factors including motivation, role enactment, beliefs, and expectations as primary determinants of HS (for a review see Lynn, Kirsch, & Hallquist, 2008). In particular, Response-Expectancy Theory asserts that expectations about one's own hypnotic responsiveness govern HS (Kirsch, 1985). Contrary to the influence of a stable latent trait, this theory ascribes the stability of HS to expectations reinforced through repeated testing: initial expectations bring about congruent responses, confirming the expectations and thus stabilizing HS (Kirsch & Council, 1992). Supporting this view, several independent groups have documented a correlation between response-expectancies and subsequent hypnotic response (Braffman & Kirsch, 1999; Green & Lynn, 2011; Kirsch & Braffman, 1999; Spanos, 1986). Social-cognitive factors such as expectation, therefore, seem to play a role in HS.

Some findings reveal a complementary effect of both latent ability and contextual expectancy on hypnotic responsiveness. Employing an integrative structural model, one account reported that although expectancies exerted some influence on hypnotic response, an abundance of the observed variance was attributable only to an underlying cognitive ability (Benham et al., 2006). Altogether, the few studies that have addressed this topic indicate that both attitude and aptitude determine hypnotic responsiveness. As a community of practitioners and scholars, therefore, it would be advantageous to explore when, how, and to what degree—rather than whether—expectations influence HS.

1.2. Expectancy modification

Response-Expectancy Theory makes a simple, testable prediction: heightened expectation should lead to increased HS. Researchers have studied this theory using experiential expectancy modifications (EMs) (Wickless & Kirsch, 1989). Participants received hypnotic suggestions for hallucinations including seeing red light and hearing strange music. In order to convince participants that they were strong hypnotic responders, the experimenters generated corresponding changes in the room by subtly adjusting light levels from a hidden panel of bulbs and playing sound from a concealed stereo. Compared to controls, participants who received EM were significantly more suggestible (Wickless & Kirsch, 1989), a result later replicated by the same researchers (Kirsch et al., 1999). An independent study following a similar paradigm, however, obtained diverging results (Benham et al., 1998). This latter group of researchers used environmental manipulations and HS measures akin to the 1989 effort, but found that HS scores were comparable across EM participants and controls.

A number of factors likely contribute to the mixed findings reported in the literature (cf. Benham et al., 1998; Wickless & Kirsch, 1989). First of all, subtle environmental specificity makes EMs difficult to replicate accurately. As a case in point, both groups of experimenters potentially compromised the consistency of their interventions by manually adjusting rheostats to control surreptitious stimuli. Comparing the two studies, the difference in HS scores among controls further obfuscates the consolidation of these independent findings. These control score differences also cast doubt on the experimental validity of standard HS scales—which rely on subjective judgments—for this particular line of research. Altogether, methodological caveats limit the conclusiveness of the existing literature on EM, prompting further studies to explore the role of expectation using rigorous experimental controls. As such, in the present study we indexed HS via objective performance on an automatic perceptual task rather than standardized HS scores.

1.3. The McGurk task

The McGurk task demonstrates a highly automatic cognitive-perceptual process that is typically impervious to conscious intervention. We have recently shown, however, that an appropriate posthypnotic suggestion can derail the effect and bring the process back into the purview of control (Raz, Dery, & Campbell, 2010). Therefore, McGurk performance following suggestion provides a novel and objective measure of HS. During the McGurk task, participants watch a video of a speaker uttering syllables (McGurk & Macdonald, 1976). In some trials, the syllable mouthed by the speaker, such as /va/, is dubbed with incongruent audio, such as /ba/. In this particular case, the participant would usually report hearing /fa/, a fusion between the phonemes /va/ and /ba/. Alternatively, the visual percept sometimes completely overrides the audio component, referred to as visual capture. Together, fusions and visual captures constitute the McGurk effect (ME), and reveal the involuntary sensory integration inherent in audiovisual perception.

The ME is a well-documented and strongly automatic perceptual phenomenon (Colin et al., 2002; Soto-Faraco, Navrra, & Alsius, 2004). Neither practice (Summerfield & McGrath, 1984) nor knowledge of the dubbing (McGurk & Macdonald, 1976) eliminates the effect. The ME persists also when participants are instructed to attend to either visual or auditory cues alone (Massaro, 1987). Furthermore, electrophysiological findings reveal that the perceptual integration of the ME begins at the level of primary auditory cortex (Kislyuk, Möttönen, & Sams, 2008).

Despite the automaticity of the ME, recent work in our laboratory has demonstrated that an appropriate suggestion can allow highly suggestible individuals to override the effect (Raz et al., 2010). After such individuals heard a posthypnotic suggestion for heightened hearing, they demonstrated fewer fusion and visual capture illusions and were able to correctly identify the audio in incongruent trials. These results add to a mounting body of evidence that suggestion can disrupt robust automatic processes in highly suggestible individuals (e.g., Iani, Ricci, Gherri, & Rubichi, 2006; Raz, Shapiro, Fan, & Posner, 2002; cf. MacLeod, 2011). In the context of the present study, therefore, McGurk performance following suggestion provided an objective index of HS.

1.4. The present study

Our study aimed to build on past work exploring response-expectancies and HS. We developed a well-documented, tightly controlled paradigm for investigating the effects of EM on hypnotic response. To ensure that each participant received the exact same exposure, we streamlined the experimental procedure by crafting an electronic system to control the timing and intensity of stimuli. In addition, we collected pre- and post-hypnosis expectation ratings from all participants.

To investigate whether EM would lead to increased HS, we tested two hypotheses: (1) that participants who underwent an EM would report greater increase in response-expectancies than controls, and (2) that participants who received an EM would respond more strongly than controls to a hypnotic suggestion for heightened hearing, as indexed by improved performance on the McGurk task (i.e., more correct responses). Furthermore, we predicted that increased expectation would correlate with improved McGurk performance.

2. Methods

2.1. Participants

Participants were 40 undergraduate volunteers enrolled at McGill University, largely recruited through the participant pool of the psychology department. All participants were proficient English speakers and reported normal or corrected-to-normal vision, no speech or hearing problems, and no previous experience with hypnosis. Tested individually, participants were randomly assigned to either an EM group or a control group (15 females and 5 males in each).

2.2. Setting

Consent forms, questionnaires, expectation ratings, measures of how suspicious participants felt, and debriefing were administered in a spacious, well-lit common room. Hypnotic sessions and McGurk tasks took place in an adjacent room with yellow–orange walls, measuring 1.20 m wide, 3.05 m long, and 2.45 m high. Ambient noise fluctuated around 42 dB. The windowless room was dimly lit by a floor lamp in the back corner, set to 55% intensity of a 100 W bulb. To decrease suspicion, we told participants that the light was dimmed to promote relaxation during the hypnotic session. Throughout their time in this room, participants sat with their backs to the lamp, facing a computer with a mock web-cam conspicuously placed on its monitor to encourage compliance with instructions.

2.3. Stimuli and apparatus

2.3.1. Hypnosis and expectancy modification

A vocal recording of Amir Raz presented hypnotic induction and suggestions through two computer speakers facing participants, at an average volume of 65 dB at the ear (for an audio file of the recording, see online Supplementary material). Using a recording rather than live hypnosis ensured consistency across participants. We programmed surreptitious EM stimuli using the open-source software "Vixen" (http://www.vixenlights.com, 2011) and the open-source "Renard SS8" hardware controller chip. This setup allowed us to precisely synchronize slowly ramping lights and sounds with the hypnosis recording. We produced light manipulations using two 100 W bulbs (one white and one red) installed in a gimmicked lamp at the back of the room. The lamp stood 1.85 m tall with a shade concealing the bulbs from participant view. Audio manipulation was accomplished using two speakers hidden in the ceiling at the far end of the room, pointing away from participants.

2.3.2. McGurk task

We adapted McGurk stimuli from previous work in our laboratory (Raz et al., 2010). The stimuli consisted of video clips presenting the face of a female English speaker pronouncing consonant–vowel syllables. There were four stimulus conditions: visual only (created by digitally removing the audio track from the audiovisual stimuli), audio only (created by replacing the video track with a still image of the woman's face), congruent audiovisual, and incongruent audiovisual. Congruent audiovisual stimuli (/ba/, /da/, /ga/, and /va/) consisted of audio of a consonant–vowel coupled with video of the same consonant–vowel. Incongruent audiovisual stimuli consisted of auditory /ba/ dubbed over visual /va/, /da/, or /ga/. Mean stimulus duration was 2270 ms and mean syllable duration was 770 ms. Videos played in Quicktime Pro at 30 frames per second. Sound was sampled at 44.100 Hz and filtered to reduce ambient noise.

Stimuli were combined into four different sessions: training (congruent-only), audio-only, video-only, and audiovisual (including both congruent and incongruent stimuli). The video-only session consisted of five repetitions of each video-only stimulus (/ba/, /da/, /ga/, and /va/). The audio-only session consisted of three repetitions of each audio-only stimulus (/ba/, /da/, /ga/, and /va/). Finally, the audiovisual session consisted of ten repetitions of each incongruent and congruent audiovisual stimulus. A flashing red screen (0.5 s in duration) appeared before each stimulus as a cue for participants to return their attention to the screen, and again after each stimulus as a cue to record their response. A black screen served as a 3 s interstimulus interval. We created four different randomized stimulus orderings and assigned participants to one of these orderings each time they performed the McGurk task.

Participants completed all four sessions of the McGurk task before hypnosis. The training, video-only and audio-only sessions ensured that participants understood the instructions and demonstrated normal hearing and vision. After hypnosis, participants performed the audiovisual session only, with a different stimulus order than the first time. After each stimulus trial, participants circled the syllable they heard on a pen-and-paper answer form. For the duration of the task, experimenters stood close behind participants to ensure proper completion.

2.4. Procedure

2.4.1. Expectancy modification

Participants in the EM group listened to a brief introduction summarizing the science of hypnosis, heard a standard hypnotic induction derived from the Carleton University Responsiveness to Suggestion Scale (Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983), and received an EM adapted from Wickless and Kirsch (1989). Participants in the control group heard the same introduction and induction, but did not undergo the EM. Before the hypnotic session, the experimenter turned off the computer monitor and draped the screen in order to prevent reflections during the light manipulations. The experimenter then left the room, while participants remained seated in front of the computer for the duration of the hypnotic session.

EM consisted of four hypnotic suggestions accompanied by surreptitious light and sound manipulations (Fig. 1). The first suggestion was to see red light fill the room. At this time, the concealed red light bulb gradually increased from 0% to 70% intensity over 49 s, stabilized for 10 s, and then decreased back to 0% over 33 s as the recording suggested the red light

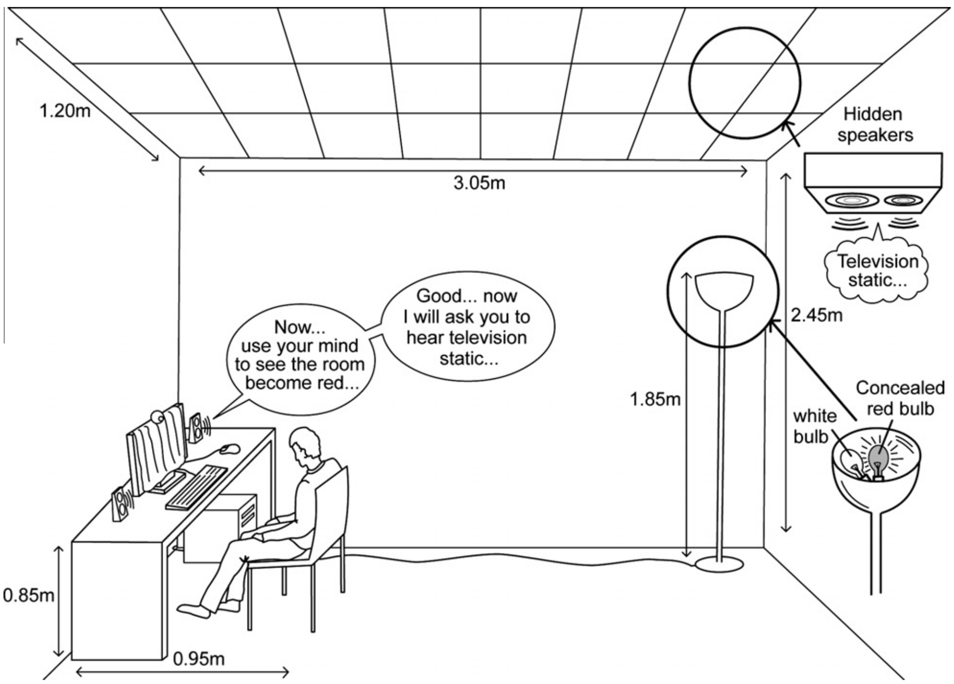

Fig. 1. Expectation modification procedure. Expectancy modification consisted of four hypnotic suggestions accompanied by surreptitious manipulation of light and sound levels in the room. Suggestions were (1) seeing the room become red, (2) seeing the room become brighter, (3) seeing the room become darker, and (4) hearing the sound of television static. A discrete computer interface, conspicuous (table) as well as hidden (ceiling) speakers, and a concealed red light bulb allowed us to precisely synchronize sound and light stimuli with the recorded hypnotic procedure. We draped the computer monitor to prevent reflections from the lamp, leaving a salient web-cam at the top. Through extensive piloting, we adjusted intensity levels and temporal delivery of light and sound stimuli to be subtle yet detectable. Diagram is realistic, albeit relative distances are not to precise scale.

dissipate. The second suggestion was to see the room become brighter. The white light bulb increased in intensity from 55% to 90% over 47 s, stabilized for 6 s, and then decreased to baseline over 22 s. The third suggestion was to see the room become darker, at which point the white light bulb decreased in intensity from 55% to 42% over 41 s, stabilized for 12 s, and then returned to baseline over 33 s. For the fourth suggestion, the recording played the sound of white noise from the conspicuous table speakers, and then suggested that participants would hear it again on their own. At this point, the volume of the hidden ceiling speakers increased from 0 dB to 45 dB at the ear over 24 s, stabilized for 15 s, and then decreased to 0 dB over 15 s upon termination of the suggestion.

2.4.2. Ratings of expectation and suspicion

Participants rated their response-expectancies twice: once before hypnosis, and again at the end of the experiment (for a copy of pre- and post-hypnosis questionnaires, see supporting information). Participants answered all questions by circling a number from one to five. Expectation ratings consisted of two questions adapted from Benham et al. (1998):

1. "If we were to hypnotize you at some future time and give you five hypnotic suggestions, how many of those do you think you would respond to?"
2. "Hypnotizability denotes how strongly an individual responds to hypnotic suggestions. Hypnotic suggestions may alter behavior or perception. How hypnotizable do you think you are?"

Along with expectation ratings, the post-hypnosis questionnaire included ratings of response to suggestion (e.g., "How strongly did you experience the suggestion for heightened hearing?"), and ratings of perceived hypnotic depth ("Keeping in mind that hypnosis refers to heightened responsiveness to suggestion which may alter behavior or perception, how deeply hypnotized were you?").

Immediately preceding debriefing, EM participants completed a suspicion rating, adapted from Kirsch et al. (1999): "Did you think that we—the experimenters—were doing something externally to help bring about the sensory effects?" After completing the measures, all participants were verbally debriefed and received a paper copy of the debriefing (see supporting information). We urged participants to keep knowledge about the stimuli manipulations strictly confidential.

2.4.3. McGurk task and suggestion

All participants completed the McGurk task twice: once before hypnosis, and again after hearing the following hypnotic suggestion for heightened hearing—adapted from a posthypnotic suggestion previously used in our laboratory to override the McGurk effect (Raz et al., 2010):

> Use your mind, like you know very well how to do, to sharpen and enhance your hearing. That's right, your hearing ability will rival that of a hunting animal such as a wolf, or even better, an owl. Everything that you hear will now be amplified, crisply audible, loud and clear. Your ears feel more sensitive and more powerful, in the sense that you can easily hear every little sound and readily detect and discern even the most faint auditory nuance. In this regard, you feel that your hearing is most dominant. It's the most dominant sense, and you can quickly and accurately report what you're hearing regardless of any other sensory information or potential distractions. While your vision remains intact and unchanged, you continue to see crisply and with normal focus. Your sense of hearing is now so acute however, that it is far surpassing your other senses. Everything you experience is auditory first, through a primary channel. What comes after is less important. You can hear things for what they are, even if they are masked or camouflaged by other information. Let your ears guide you as you pay attention to the sounds that you are about to hear. Nothing is more important than what you are able to hear. If you are ever unsure of what's going on, your ears will guide you to the right answer. Everything else is secondary; primary is your power of super hearing.

Control participants heard the above suggestion immediately following hypnotic induction, and participants in the EM group heard it following EM. After the suggestion for heightened hearing, the recording instructed participants to remain relaxed as the experimenter returned to prepare the task. At this point, the experimenter entered, undraped and turned on the computer monitor, and administered the McGurk task again.

3. Results

3.1. McGurk performance

We inspected performance on practice, audio only, and visual only McGurk sessions to ensure that participants understood and could carry out the task. We were primarily interested in analyzing performance on audiovisual McGurk sessions. For congruent audiovisual McGurk stimuli, we coded answers as correct if participants reported hearing the presented syllable. For incongruent stimuli, we coded answers as correct only if participants reported hearing /ba/, because this syllable was always the audio component.

Contrary to our primary hypothesis, McGurk performance was unaffected following suggestion among both controls and EM participants (Table 1). A repeated-measures ANOVA with *group* (EM vs. control) and *time* (pre- vs. post-hypnosis) as

Table 1
Mean McGurk scores (number of correct responses) and combined expectation ratings at pre- and post-hypnosis for control participants and expectation modification participants.

	Control		Expectation modification	
	Pre-	Post-	Pre-	Post-
McGurk score	48.75 (8.64)	47.00 (8.67)	48.9 (9.82)	48.20 (8.92)
Expectation rating	5.65 (1.04)*	6.75 (1.62)*	5.80 (1.96)*	7.25 (2.20)*

Standard deviations in parentheses. $N = 40$.
* $p < .05$.

independent variables, and *number of correct responses* as the dependent variable, yielded no significant main effects or interactions.

3.2. Expectation

Across groups and times, the two expectation measures were significantly correlated ($r(39) = .78$, $p < .001$). As such, we collapsed the two ratings into a combined expectation rating for further analysis. A repeated-measures ANOVA yielded a main effect of *time* (pre- vs. post-hypnosis) on *combined expectation ratings* ($F(1,79) = 10.504$, $p < .01$), but no main effect of *group* (EM vs. control) or interactions. Mean combined expectation ratings increased following hypnosis in both groups (Table 1); yet, contrary to our prediction, ordinary-least-squares regression analysis revealed that, across both groups, change in expectation was unrelated to change in McGurk performance ($b = 0.01$, $t(39) = 0.04$, $p = .97$).

4. Discussion

Here we show that, at least within the present experimental context, response-expectancies are unlikely a primary determinant of high HS. We tested two hypotheses: first, that participants who experienced EM would report greater increase in response-expectancies than controls; and second, that participants who experienced EM would respond more strongly than controls to a hypnotic suggestion for heightened hearing, as indexed by improved performance on the McGurk task. Our results do not support either hypothesis. Neither change in response-expectancies nor improvement on the McGurk task differed between groups. Moreover, increased expectation was seemingly inadequate to improve response to the suggestion for heightened hearing. Instead, we found that despite a significant increase in expectation among participants in both groups, neither group showed improved McGurk performance following suggestion. Furthermore, increased response-expectancies were statistically unrelated to improved McGurk performance. As such, our results indicate that expectations scarcely account for strong HS.

It is possible that the extreme automaticity of the McGurk effect rendered the task too difficult to detect increases in HS brought about via heightened expectations. Had we chosen a different automatic task (e.g., Stroop), we may have had more success detecting changes in hypnotic responsiveness. Furthermore, although we were unable to demonstrate a behavioral effect in terms of McGurk performance, heightened expectations may have led to tangible alterations in brain function. Indeed, neuroimaging assays can sometimes reveal measurable physiological changes in the absence of significant behavioral findings (e.g., Fan, Fossella, Sommer, Wu, & Posner, 2003). Thus, although we hardly observed behavioral differences as a function of expectation and suggestion, brain imaging could potentially reveal underlying disparities in neurocognitive mechanisms recruited during the McGurk task. Future work would be necessary to explore such experimental avenues.

In addition to constraining the notion that response-expectancies can transform individuals into high hypnotic suggestibles, our findings intimate that standard HS scales may exaggerate the effects of attitudinal factors including expectation. In previous studies, heightened expectations may have led participants to rate their responses to suggestion more strongly, regardless of their actual hypnotic ability. Moreover, the subjective impressions of participants likely influenced their behavior, which may have affected the so-called "objective" judgments of the hypnotist. In our study, although participants across groups believed they were responding strongly to the suggestion for heightened hearing, their McGurk performance revealed otherwise. Such discrepancies between subjective impressions and veridical cognitive responses would be unapparent in standard HS scales. Therefore, we encourage future research on the determinants of HS to use clear, objective measures of hypnotic response.

An unexpected increase in expectations among control participants both complicates and enriches our findings. The increase in expectations among controls did not differ significantly from the increase in expectations among EM participants. This pattern of results suggests that the EM intervention hardly altered expectations beyond the influence of the other aspects of the procedure that both groups shared. One potential explanation for the heightened expectations is that participants felt they were responding strongly to the suggestion for heightened hearing as a function of drawing their attention to their auditory perception. Although their unaltered McGurk performance implies that their hearing remained unaffected, their subjective impressions would have greatly impacted their expectations. An alternative explanation is that the induction was sufficient to increase response-expectancies. Effortless responses to suggestions for relaxation and eye closure may have established expectations for subsequent hypnotic performance. Future experiments should explore how hypnotic induction affects response-expectancies.

Our study had some limitations. Firstly, the present McGurk paradigm differed slightly from our previous work (Raz et al., 2010). Namely, the current paradigm employed hypnotic rather than posthypnotic suggestion, and a recording rather than a live hypnotist. We chose hypnotic suggestion to maximize responsiveness of participants, because hypnotic suggestions are likely more potent than identical posthypnotic suggestions (Oakley & Halligan, 2011). In addition, we chose a recorded procedure to ensure consistency across participants. Hypnotic modulations of related automatic effects (e.g., the Stroop effect) appear to transcend such minor procedural differences. For example, one study showed that a recorded hypnotic suggestion adapted from a previously-used live posthypnotic suggestion led to similar reductions in Stroop interference (Raz, Kirsch, Pollard, & Nitkin-Kaner, 2006). Thus, the modulation of automatic processes among adept hypnotic subjects seems to generalize beyond specific procedural parameters such as the method of suggestion delivery. Further work in our laboratory will confirm the ability of highly suggestible individuals to override the McGurk effect under the present experimental conditions. Finally, moderate suspicion reported by EM participants is worth noting ($M = 3.25$ out of 5, $SD = 1.30$). Regression analyses, however, revealed no significant relationships between suspicion ratings and McGurk performance, response-expectancy ratings, or subjective ratings of response to suggestion. Furthermore, participants consistently demonstrated surprise upon debriefing. As such, we are confident that participant suspicion did not compromise the validity of our results.

A single empirical study rarely resolves a long-standing controversy such as whether and how much expectation influences response to suggestion. A conundrum of this magnitude requires converging evidence from multiple methodological approaches and independent groups. Rather than conclusively resolving the debate, therefore, the present study reflects a pivotal piece of a larger puzzle and a methodological and theoretical impetus for future investigation.

5. Conclusion

We explored the role of expectation in HS. Our findings demonstrate that response-expectancies are likely insufficient to govern the deeply-ingrained perceptual integration inherent in the McGurk effect. Here we show that the complex relationship between hypnosis and expectation is hardly reciprocal. On the one hand, the experience of a hypnotic procedure seems to influence expectations. On the other hand, at least in the present experimental context, expectations scarcely propel high HS. Our findings imply neither that hypnotic response is entirely independent of expectation, nor that hypnotic abilities are fixed and immutable. For example, HS training—programs that teach individuals how to form specific expectations—may lead to moderate increases in hypnotic response (cf. Gfeller & Gorassini, 2010). Collectively, such findings pave the road to a more scientific understanding of hypnotic ability. While the conundrum persists and the exact determinants of HS remain unclear, the present study shows that although response-expectancies may support hypnotic ability, they are likely insufficient to improve responsiveness to a suggestion to override a deeply-ingrained automatic process. Expectation, therefore, may enhance response to suggestion, but our present findings temper the strength, generalizability, and scope of this prospect.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.concog.2012.02.002.

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