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Abstract: The current study is the first to investigate confabulatory introspection in relation to clinical psychological symptoms utilizing the Choice Blindness Paradigm (CBP). It was hypothesized that those with obsessive-compulsive symptoms are more likely to confabulate mental states. To test this hypothesis, an experimental choice blindness task was administered in two nonclinical samples ($n = 47$; $n = 76$). Results showed that a confabulatory introspection is significantly related to obsessive-compulsive symptoms. There was evidence for its specificity to symptoms of OCD depending on the obsessional theme addressed in the choice blindness task. However, confabulatory introspection was also found to be relevant to other symptoms, including depression and schizotypy. The results highlight a potentially fruitful new area of clinical investigation in the area of insight and self-knowledge, not limited to OCD alone, but potentially other disorders as well.

Keywords: Choice Blindness, Confabulation, Introspection, Self-Knowledge, Obsessive-Compulsive Disorder, OCD, Depression, Schizotypy

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Choice Blindness, Confabulatory Introspection, and Obsessive-Compulsive Symptoms: A New Area of Investigation

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Obsessive-compulsive disorder (OCD) is a serious mental health problem that is characterized by frequent obsessions and compulsive behaviors. The most common subtypes of OCD revolve around washing and checking, where the person has frequent obsessions that, for example, he or she may be contaminated or has forgotten to lock the door. However, a large subgroup of OCD experience obsessions without any overt compulsions that relate directly to the self (Moulding, Aardema, & O'Connor, in press). Typically, these obsessions are self-referential in nature and revolve around frequent thoughts about blasphemy, aggression, and sexuality (e.g., "I might be a murderer"; "I might be a sexual deviant"; Aardema & O'Connor, 2007).

Cognitive-behavioral formulations of OCD propose that obsessions develop from intrusive cognitions depending on how they are appraised or interpreted (Clark & de Silva, 1985; Purdon & Clark, 1993; Rachman, 1997; Salkovskis, 1985). For example, the person sees a knife and then imagines an intrusive scenario of killing someone; the intrusive thought or scenario is consequently interpreted as proof of intent to commit murder. In other words, it is not the intrusive cognition itself, but how the person interprets these thoughts that lead to obsessions. Yet this also raises the long-standing question, as to why obsessions almost always seem to contradict the person's actual self (Rachman & Hodgson, 1980).

For example, one of our clients, while standing in front of a bank teller, suddenly had the thought that he might have robbed the bank. With this thought, he abruptly ran out of the bank and down the street to avoid capture. The obsession went completely against the actual events that had occurred, as well as the character of the individual, and yet the obsession is treated as realistic. The person has no history of aberrant behavior, is quite concerned about the welfare of others, and yet is unable to emotionally disconnect from a sense of self as dangerous. How is this possible? How does such false belief formation about the self occur?

One explanation offered by Aardema and O'Connor (2007) is that metacognitive judgments about ourselves can easily get mixed up with the actual states we are actually in; this to the extent that the false judgements are indistinguishable from the actual states. There is considerable evidence that people have limited access to the reasons for their evaluations and that the process of generating reasons can have negative consequences (Wilson & Dunn, 2003). In particular, the influential studies of Nisbett and Wilson (1977) have shown that people are capable of quite literally inventing mental states, and that a fundamental limit on self-knowledge is the inaccessibility of non-conscious automatic processing to conscious awareness. These processes highlight the limitations of awareness to the extent that it is possible to arrive at false conclusions of ourselves, even in the complete absence of any evidence to support it (Aardema & O'Connor, 2007). Fleeting thoughts and images that do not justify a particular inference about the self can nonetheless be viewed by the person with OCD as evidence for perhaps being a dangerous person (Riskind, Ayers, & Wright, 2007).

The notions of limited introspective access and the confabulation of mental states seem most apparent in so-called "repugnant obsessions," where the content

of the obsessions is often self-referential. As noted earlier, these obsessions often take the form of a self-evaluation that requires introspection to arrive at. If introspection is faulty, then naturally this will also be the case for the self-evaluation. However, limited introspective access may apply to other forms of OCD as well, such as contamination or checking. As noted by O'Connor and Aardema, in their inference-based conceptualization of OCD, obsessions in general can be understood as inferences, where the person arrives at an obsession through reasoning ("I might be contaminated"; "I might have run over someone with my car"; Aardema & O'Connor, 2003; O'Connor, 2002; O'Connor, Aardema, & Pélissier, 2005). Such inferences of doubt typically come about through a narrative that is characterized by a distrust of the senses and an overreliance on the imagination, often in opposition to actual reality (Aardema, O'Connor, Pélissier, & Lavoie, 2009; Aardema & O'Connor, 2012). As such, limited introspective access, and its association with a tendency to arrive at inferences on a subjective basis, could potentially contribute to the formation of such obsessional inferences or beliefs. Attenuated access to internal states has also been proposed to give rise to pervasive doubting and checking in OCD (Lazarov, Dar, Liberman, & Oded, 2012).

Despite the proposed link between introspection and OCD, perhaps relatively apparent from a phenomenological perspective, there is currently no direct empirical evidence to support this view. As noted by Johansson, Hall, Sikström, Tärning, and Lind (2006), after some initial publications in the '80s striving to advance the methodology of Nisbett and Wilson, the empirical debate on introspective access came to a standstill ". . . with multiple layers of inconclusiveness confusing just about everyone involved" (p. 674). Hence, despite the seminal and influential nature of Nisbett and Wilson's early experiments on introspection, a comprehensive research program on introspection failed to emerge, much less found any application to clinical disorders. More recently, however, Johansson and Hall (Johansson, Hall, Sikström, & Olsson, 2005; Johansson et al., 2006; Hall et al., 2012) have developed the *choice blindness paradigm* (CBP), which provides a novel and systematic method for investigating individual differences in confabulatory introspection while circumventing some of the methodological problems of the original studies on introspection (see White, 1988). In particular, the CBP does not rely on any form of subjective assessment, but instead, employs an objective criterion for the occurrence of confabulatory introspection.

In the initial studies of Johansson and colleagues (2005, 2006) participants were presented with pictures of two female faces, while being asked which one they found more attractive. Then, after the participants made their choice, one of the photographs was presented a second time, and the participants were asked to provide the reasons for their choice. However, unknown to the participants, the experimenter had swapped the chosen photograph with the non-chosen photograph. Despite this swap, a significant portion of participants provided a justification for the choice they had not made. In other words, not only did participants fail to notice the mismatch between their initial choice and the photograph presented by the experimenter, they also confabulated reasons for the choice they had

not made. Apparently, a substantial portion failed to demonstrate introspective access or insight into the reasons for their choice.

While these studies appear to demonstrate the occurrence of confabulatory introspection, one point of contention has been whether or not choice blindness could be an artifact of experimenter-participant dynamics (Moore & Haggard, 2006). In other words, people might simply provide reasons for the switched choice in order to please the experimenter. However, this explanation is inconsistent with the apparent surprise experienced by many participants during debriefing when they discover that their answer had been switched (Hall, Johansson, Sikström, Tärning, & Lind, 2006). Likewise, participants nearly always believe they *would* have noticed such a switch when faced with a “hypothetical” description of the actual experiment in which they have participated (e.g., see section 2.3, and the discussion of “choice blindness blindness” in Johansson et al., 2005).

More recently, the CBP has also been successfully adapted to measure introspective access in contexts beyond trivial decisions and choices. Moore and Haggard (2006) have suggested that choice blindness may not occur for decisions that hold importance to the person, but recent studies have shown that confabulatory introspection also occurs when people have to make political or moral decisions—the latter a frequently recurring theme in obsessions (Hall, Johansson, & Strandberg, 2012; Hall et al., 2013). During these studies, participants completed a paper and pencil version of the CBP and were presented with an answer to a multiple choice question that they did not actually make. For example, in Hall, Johansson, and Strandberg (2012), participants were asked to indicate their level of agreement with several moral and ethical statements. Some of the choices were subsequently switched in opposition to the original choice. Again, people often failed to notice the choice reversals and confabulated mental states and reasons for choices they did not make.

Given the tendency of those with OCD to arrive at false conclusions about themselves without any actual evidence (Aardema & O'Connor, 2007; Riskind et al., 2007), we hypothesized that people with OC symptoms, and particularly those with obsessions, are particularly vulnerable to failures in introspection. It was expected that these relationships would be independent from negative mood states. Even though confabulatory introspection seems relevant to symptoms to OCD, there has been very little research on individual differences in introspective access, much less any application to clinical disorders. Hence, even though a relationship with obsessiveness might be expected, there is no current empirical evidence that it might not be relevant to other disorders as well. For example, lack of cognitive insight and limited self-knowledge has also been noted in schizotypy and delusion proneness (Beck & Warman, 2004). Likewise, limited introspective access might also be expected to apply to depressive symptoms given the link between choice blindness and attentional deficits (Hooper, McHugh, Hopthrow, Tekin, Iskin, & Ilkman, submitted; Simons, 2000).

To test these hypotheses, an experimental choice blindness task was administered in two community samples (Study 1 and Study 2, respectively). In both

studies, participants completed a measure of obsessive-compulsive symptoms, as well as measures of anxiety, depression, and schizotypy. Study 1 represents initial findings validating the task, as well its relationship with obsessive-compulsive symptoms and other measures. The second study aimed to extend the findings of Study 1 using a choice blindness task with a different choice reversal than the one utilized in Study 1. It was expected that this task would show stronger relationships between confabulatory introspection and symptoms of OCD than those found in the first study, including specificity to OCD symptoms independent from negative mood states. Finally, a measure of social desirability was included in both studies to exclude the possibility of participant–experimenter dynamics.

STUDY 1

METHOD

Participants

Participants were recruited from the general population through advertisements in newspapers, newsletters and online through the Laboratory of Psychometric and Experimental Studies into Obsessionality located at Centre de Recherche de l'Institut Universitaire en Santé Mentale de Montréal. Initially, participants were screened by telephone utilizing a mental health screening questionnaire—*Questionnaire Sur La Santé* (Kirouac, Denis, Fontaine et al., 2006). Potential participants were excluded from the study if there were any indications of a potential psychological disorder. Those who were included were asked to complete at home a battery of self-report questionnaires sent by mail. Once the questionnaires were returned, participants were invited to the laboratory for the experiment. Participants received 30 CAD as compensation for their time. The final sample consisted of 47 participants (31 female, 16 male). The average age was 36.4 years ($SD = 12.5$; range 19–63 years). Educational levels were as follows: 10.6% had a high school education, 19.1% had a postsecondary preparatory college education, and 69.6% had a college or university education. Marital status was as follows: 43.5% married or cohabiting, 52.2% single, and 4.3% divorced or separated.

Questionnaires

Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004). The VOCI is a 55-item self-report questionnaire for measuring obsessive-compulsive symptoms. The questionnaire contains several subscales derived from factor analysis, including: Obsessions, Checking, Contamination, Just Right, Indecisiveness, and Hoarding. The VOCI demonstrates a strong reliability (0.90–0.98), good convergent validity with similar measures of obsessionality ($r = 0.74$ to 0.85), and divergent validity with measures of distressed mood ($r = 0.36$ – 0.47). Items are answered on a 5-point scale ranging from 0 (not at all), 1 (a little), 2 (some), 3 (much), to 4 (very much) in response to each item. The current study focuses on the obsessions (i.e., blasphemy, sexuality, and aggression), checking, and con-

tamination subscales of the VOICI, which represent domains that are consistently identified across OC measures as well as constitute some of the most prevalent OC subgroups (Summerfeldt, Richter, Antony, & Swinson, 1999; Wu, Aardema, & O'Connor, 2009).

The Beck Anxiety Inventory (BAI). The BAI (Beck, Epstein, Brown, & Steer, 1988) is a 21-item (0–3 scale) measure of anxiety experienced in the last week. The instrument has shown strong internal consistency (0.91), good test–retest reliability (0.75), moderate convergent validity with the revised Hamilton Anxiety Rating Scale (0.51), and discriminant validity with the Hamilton Depression Rating Scale (0.25).

Beck Depression Inventory II (BDI). The BDI (Beck, Steer, & Brown, 1996) is a 21-item measure that assesses the severity of depressive symptoms experienced by respondents during the previous 2 weeks. It is a frequently used and highly reliable and valid measure of symptoms of depression.

Schizotypal Personality Questionnaire (SPQ). The SPQ (Raine, 1991) is a 74-item self-report scale based on *DSM-III-R* criteria for schizotypal personality disorder. It was added to the study at a later stage with a total of 28 participants completing the questionnaire. It contains subscales for all nine schizotypal traits, including ideas of reference, magical thinking, unusual perceptual experiences, suspiciousness, social anxiety, no close friends, inappropriate or constricted affect, odd speech, and odd behavior. The total score has been found to have high reliability (0.82) and good convergent (0.59–0.81) and criterion validity (0.68). Items are answered with either “yes” or “no.”

Marlowe-Crowne Social Desirability Scale–Form C (MCSD). The MCSD-C (Crowne & Marlowe, 1960; Reynolds, 1982) is a 13-item scale measuring social desirability. It was included at a later stage in the study for the purpose of investigating whether or not confabulation could be explained by a tendency of participants to present themselves favorably or a need for approval. A total of 28 participants completed the scale. The MCSD-C has good reliability (0.76). Items are answer on dichotomous scale: true or false. Higher scores indicate a higher level of social desirability.

Choice Blindness Task

The Choice Blindness Task (CBT) utilizes a validated paper and pencil method for measuring choice blindness and confabulation. It has been shown to be a powerful and elegant method of inducing confabulatory introspective states even during important decision tasks (Hall, Johansson, & Strandberg, 2012). Initially, participants are presented with a written scenario designed to induce a certain level of belief that an aversive event might have occurred. The scenario, in which the person was led to believe an accident might have happened, which included information about the circumstances of the possible accident (see Aardema, O'Connor, Péllisier, & Lavoie, 2009).

You're on your way to work with the car. Earlier in the morning you read about an accident where a truck driver unknowingly drove over someone, and left the scene of the accident without realizing. You wonder how it is possible that someone could not notice this. As you drive along, you come across an intersection and come to a stop at the stoplight. It is quite busy, with a lot of people on the other side of the intersection waiting to cross the street. You notice a group of young people on the sidewalk, boys and girls, chasing each other. The light turns green and you begin to accelerate. You see some potholes in the street, trying to avoid them. Then, just as you pass the intersection you feel a bump with your car. Only one second later, you hear a scream. You quickly look in the rear-view mirror, and to your relief you see no-one lying in the road. However, it is quite crowded and busy at the intersection, and you may not have been able to see everything. You then park your car on the side of the road, look at the expression on people's faces, and see nothing which may indicate an accident. However, the lack of expression on people's faces could also be shock with seeing someone hurt.

After reading of the scenario, participants were asked to rate their level of disagreement or agreement with ten different statements, which were phrased either in support or against the idea of an aversive event having occurred. Most of these statements merely functioned as filler items with the exception of one item, which stated: "*The lack of expression on people's faces probably means nothing.*" Answers were given on a 6-point scale ranging from disagreement to agreement without any neutral score in the middle. Next, participants were asked to briefly work on a filler task—an eight-item muscle tension questionnaire (Tension Questionnaire) not relevant to the current study. In the meanwhile, unknown to the participant, the experimenter used a magic trick to switch one statement to its direct opposite (see Figure 1).

Specifically, the original item "*The lack of expression on people's faces probably means nothing*" was switched to "*The lack of expression on people's faces probably indicates shock.*" In effect, this is the equivalent of reversing the rating score to the mirror side of the scale. For example, a person who agreed with the statement (a rating of 4 or higher) "*The lack of expression on people's faces probably means nothing*" has now agreed with the statement that "*The lack of expression on people's faces probably indicates shock*" (a rating of 4 or higher). Conversely, a person who initially disagreed with the statement "*The lack of expression on people's faces probably means nothing*" (rating of 3 or lower) has now disagreed with the opposite statement "*The lack of expression on people's faces probably indicates shock*" (rating of 3 or lower).

After the switch, we asked participants to write down reasons for the choices they made on each of the items, including item 8 (the switched choice). Participants were asked to check the statement and their answer each time before writing down the reason for their choice. In other words, the occurrence of choice blindness and confabulatory introspection was operationalized by the *act* of writing down reasons in support for a choice they did not actually make (item 8). If choice blindness and confabulatory introspection did not occur, which usually manifested in the form of comments from the participant such as "I did not intend to make that choice," "I gave the wrong answer before," then the participant was allowed to correct his/her "mistake." This occurred quite naturally, as everyone is familiar with occasionally misreading a survey question, and thus attributed the error to themselves.

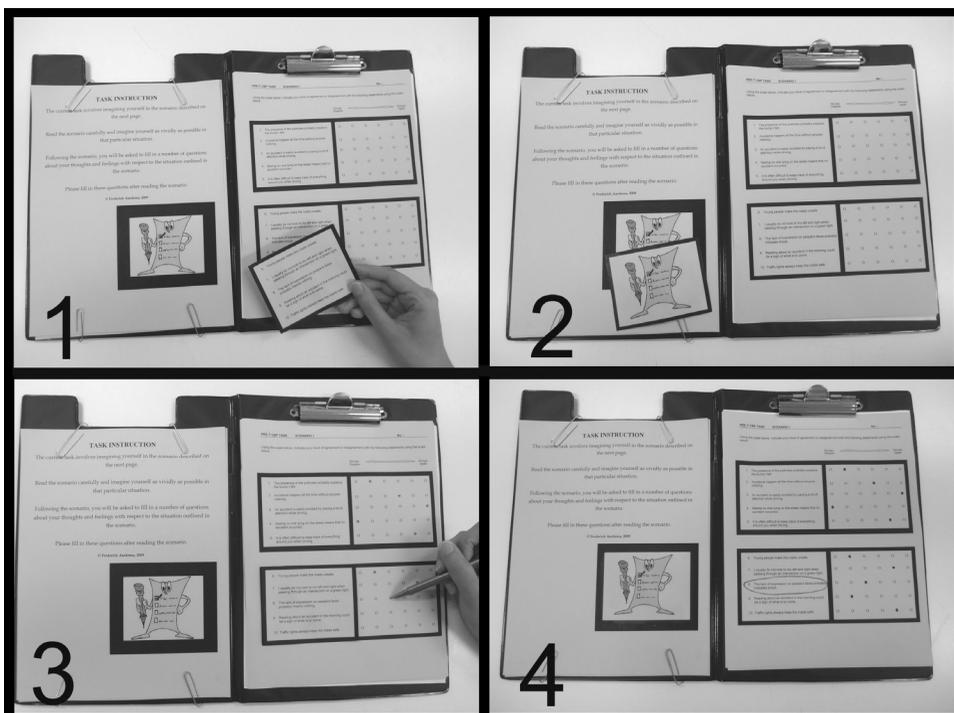


FIGURE 1. A snapshot of the choice procedure during a manipulation trial. (1) The questionnaire is attached to a two-page clipboard, with instructions on the left side and questions about the scenario on the right side. A slip of paper is attached to the second page on the right side with glue, covering up the items underneath it. The questionnaire items on the paper slip are identical to the items on the questionnaire concealed underneath it, with one exception: item 8 on the slip of paper is phrased in opposition to the concealed item. (2) The other side of the paper slip shows a cartoon that is identical to the cartoon on the left side of the clipboard. (3) With the paper slip attached to the right page, participants rate their agreement with the statements in the questionnaire on the right side of the clipboard. After they complete the questionnaire, they are asked to complete a filler task. At this point, the experimenter closes the two-page clipboard. (4) When the experimenter opens the two-page clipboard again, the paper slip from the right page is now stuck to a patch of stronger glue on the left page of the clipboard, and remains attached there. To the participant, nothing out of the ordinary has occurred. Because the other side of the paper slip, now attached to the left page, shows the same cartoon as the left page of the clipboard, nothing appears different. However, now that the paper slip is glued the left side of the clipboard, the formerly concealed item 8 on the questionnaire on the right page is revealed, phrased so that the meaning is the direct opposite of the item that the participant originally answered (circled in the image for the purpose of demonstration).

The occurrence of choice blindness and confabulatory introspection was also assessed *retrospectively* during the “debriefing” procedure. This assessment was designed to control for the effects of social desirability in the event a participant may be unwilling to admit to the experimenter that he or she may have made a “mistake” earlier. The first question was as follows: “We plan to do a follow-up

TABLE 1. Means Standard, Deviations, and Intercorrelations Study 1 (n = 47)

	M	SD	VOCI-O	VOCI-CH	VOCI-CO	SPQ	BAI	BDI
VOCI-O	2.67	3.56						
VOCI-CH	0.98	1.44	.31					
VOCI-CO	3.37	3.22	.54	.42				
SPQ	11.43	9.73	.26	.05	-.07			
BAI	5.94	5.08	.39	.04	.05	.09		
BDI	6.17	6.14	.70	.17	.32	.37	.44	
MCS D	6.25	2.96	-.10	-.07	.06	-.45	-.28	-.22

Note. Significant correlations are represented in bold ($p < 0.05$). $n = 28$ for the MCS D and the SPQ. VOCI-O = Vancouver Obsessional Compulsive Inventory–Obsessions Subscale; VOCI-CH = Vancouver Obsessional Compulsive Inventory–Checking Subscale; VOCI-CO = Vancouver Obsessional Compulsive Inventory–Contamination Subscale; SPQ = Schizotypal Personality Questionnaire; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; MCS D = Marlowe-Crowne Social Desirability Scale (form C).

experiment, in which we are going to switch the answers people give before asking them to provide reasons—do you think you would have noticed this if you had participated in that experiment?” If they said yes, the second question was: “Did you notice any switched answers in the current experiment?” As such, participants were given plenty of opportunity to voice they had noticed, especially since the more socially desirable answer to the second question is yes, following an affirmative answer to the first question.

RESULTS

Means, Standard Deviations, and Intercorrelations

Means, standard deviations, and intercorrelations of the self-report measures are reported in Table 1. The VOCI-O, VOCI-CH, and VOCI-CO were all moderately correlated with each other. The VOCI-O showed the strongest relationships with the SPQ, BAI, and BDI. Higher scores on the SPQ were also associated with lower scores on social desirability as measured by the MCS D.

The Frequency of Confabulatory Introspection

Forty-seven participants completed the CBP. A total of 28 participants provided reasons for the switched choice, whereas 19 participants did not. The participants who did not confabulate changed their answer on the switched choice they were presented, assuming they had previously made a mistake, corrected their answer, and subsequently provided reasons that were congruent with their original choice. The participants who corrected “their” mistake clearly did not confabulate. However, among the 28 participants that did appear to confabulate, there were 4 participants who provided reasons congruent with their original choice without correcting their answer. This represents a failure of the intended manipulation and these participants were removed from any subsequent analysis. The final sam-

TABLE 2. Differences Between Those Who Confabulated and Those Who Did Not Confabulate on Self-Report Measures in Study 1

	No Confabulation			Confabulation			<i>F</i>	<i>p</i>
	<i>n</i>	<i>M</i>	(<i>SD</i>)	<i>n</i>	<i>M</i>	(<i>SD</i>)		
VOCI- O	19	1.37	(2.03)	24	3.71	(4.31)	4.75	0.035
VOCI- CH	19	0.79	(1.36)	24	1.13	(1.51)	0.57	0.312
VOCI - CO	19	3.63	(3.77)	24	3.17	(2.78)	0.22	0.644
SPQ	11	5.27	(4.50)	15	14.27	(8.66)	9.85	0.004
BAI	19	4.21	(3.26)	24	6.96	(5.90)	3.31	0.076
BDI	19	3.58	(4.21)	24	7.75	(7.03)	5.20	0.028
MCSD	11	7.46	(2.21)	15	5.33	(3.37)	3.29	0.082

Note. VOCI-O = Vancouver Obsessional Compulsive Inventory–Obsessions Subscale; VOCI-CH = Vancouver Obsessional Compulsive Inventory–Checking Subscale; VOCI- CO = Vancouver Obsessional Compulsive Inventory–Contamination Subscale; SPQ = Schizotypal Personality Questionnaire; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; MCSD = Marlowe-Crowne Social Desirability Scale (form C).

ple of 43 participants therefore consisted of 24 of participants who confabulated (55.8%) and 19 participants (44.2 %) who did not confabulate.

Debriefing

The validity of the CBP was established retroactively during debriefing. With regards to the first question asked during the debriefing, whether or not the participants anticipated noticing their choice being switched in a hypothetical follow-up study, almost all participants who confabulated responded they would ($n = 22$; 90.7%). With regards to the second question, whether or not they noticed their choice had been switched in the current experiment, all participants who confabulated responded they had not noticed ($n = 24$; 100%). These results indicate that if confabulation occurred, participants did not merely try to please to experimenter. Finally, despite the use of deception in the current task, most participants reacted positively and with surprise when the switch was explained to them. None of the participants reacted negatively during debriefing.

Demographics Variables and Confabulation

Chi-square analysis did not reveal any significant differences in gender or educational level between participants who confabulated, and those who did not. An independent samples *t*-test showed there was a trend for those who confabulated to be older than those who did not confabulate ($M = 39.58$ vs. 33.16), $t(41) = 1.71$; $p = 0.095$.

The Relationship of Confabulation with OC Symptoms and Other Measures

Differences on OC symptoms and other measures between no confabulation versus confabulation are represented in Table 2. Multivariate analysis of variance (MANOVA) with two-tailed comparisons on the main OC-related outcome measures revealed a significant overall effect, $F(3, 39) = 3.31$; $p = 0.03$. Tests of

between-subjects effects showed that those who confabulated scored significantly higher on the VOCI-O as compared to those who did not, $F(1, 41) = 4.75$; $p = 0.035$. There were no significant differences on the VOCI-CH and VOCI-CO.

The remaining measures were investigated through analysis of variance (ANOVA), which showed a highly significant difference on the SPQ, $F(1, 24) = 9.85$; $p = 0.004$. In addition, there was a significant difference on scores on depression as measured by the BDI, $F(1, 41) = 5.20$; $p = 0.028$. There was no significant difference on the BAI. Social desirability as measured by the MCSD trended *lower* among those who confabulated, $F(1, 24) = 3.29$; $p = 0.082$.

Finally, in order to explore the specificity of confabulatory introspection to obsessionality independent from negative mood states, an ANOVA was conducted with the VOCI-O entered as the dependent variable and the BDI and BAI entered as covariates. Doing so, revealed the BDI as a significant covariate, $F(1, 39) = 23.15$; $p < 0.001$, while the effect of confabulation on the VOCI-O was no longer significant, $F(1, 39) = 0.51$; $p = 0.48$. Interestingly, however, the opposite was also the case if the VOCI-O is entered as a covariate when calculating differences on depression. In that case, the VOCI-O emerged as a significant covariate, $F(1, 40) = 30.77$; $p < 0.001$, while the effect of confabulation on the BDI was no longer significant, $F(1, 40) = 1.10$; $p < 0.301$.

SUMMARY

Study 1 showed the Choice Blindness Task to be a viable instrument to measure individual differences in confabulatory introspection with a substantial number of participants providing reasons for a choice they had not made (55.8%). The validity of the task was confirmed during debriefing. There was also a trend for those who confabulated to behave in a *less* socially desirable manner. Therefore, it seems unlikely that the occurrence of confabulatory introspection can be accounted for by experimenter–participants dynamics.

Study 1 also showed that confabulatory introspection was related to obsessions, but not to checking or contamination. The results therefore provide some level of support to the relevancy of choice blindness and confabulatory introspection to specific symptoms of OCD. However, those who scored higher on schizotypy and depression also were more likely to confabulate. In addition, differences on the VOCI obsessions subscale were not independent from depression, and vice versa. Hence, even though the results do not provide evidence for the specificity of confabulatory introspection to specific OC symptoms, further research into the application of the CBP to clinical disorders is clearly warranted.

STUDY 2

Following Study 1, we aimed to refine the findings of the previous study in a separate sample, while addressing some potential limitations. Specifically, apart from a

relatively small sample size, especially for some measures, the previous study was limited by the content of the item that switched, involving an interpretation of the expression on people's faces. Given the heterogeneity of OCD, the importance of confabulatory introspection to symptoms may be thematic, where problems with introspection are more likely to occur in those areas of life most relevant to symptoms. For the second study, therefore, a slightly adapted CBT task was used, this time using an item that was judged to more closely correspond to symptoms of OCD. Otherwise, for the second trial, the same methodology and measures were used.

METHOD

Participants

Participants in Study 2 were recruited through the same procedure as outlined in Study 1. The sample consisted of 76 participants (53 female, 23 male). The average age was 37.2 years ($SD = 15.3$; range 18–69 years). Educational levels were as follows: 1.3% had an elementary school education, 18.4% had a high school education, 30.3% had a postsecondary preparatory college education, and 50.0% had a college or university education. Marital status was as follows: 26.3% married or cohabiting, 63.2% single, and 10.5% divorced or separated.

Questionnaires

Vancouver Obsessional Compulsive Inventory (VOCI). See Study 1.

The Beck Anxiety Inventory (BAI). See Study 1.

Schizotypal Personality Questionnaire (SPQ). See Study 1.

Beck Depression Inventory II (BDI). See Study 1.

Marlowe-Crowne Social Desirability Scale-form C (MCSD). See Study 1.

Choice Blindness Task

The choice blindness task was identical to the task administered in Study 1 with the exception of the content of the item that was switched during the task. While the previous study focused on an item of a more social nature, involving an interpretation of the expression on people's faces, a different item was chosen for the second study. Specifically, after reading the scenario, participants were initially presented with the statement "The bump I felt with the car is likely explained by a pothole." Next, after the item was rated by the participant on a scale from 1 to 6, it was subsequently changed to its opposite, namely "A pothole is unlikely to explain the bump I felt with the car." And again, like in Study 1, participants were asked to provide reasons for the choice they had not actually made.

TABLE 3. Means Standard, Deviations, and Intercorrelations in Study 2 (n = 76)

	M	SD	VOCI-O	VOCI-CH	VOCI-CO	SPQ	BAI	BDI
VOCI-O	2.67	3.56						
VOCI-CH	0.98	1.44	.60					
VOCI-CO	3.37	3.22	.47	.77				
SPQ	11.43	9.73	.57	.18	.18			
BAI	5.94	5.08	.54	.54	.55	.47		
BDI	6.17	6.14	.61	.41	.44	.58	.75	
MCSD	6.25	2.96	-.32	-.16	-.12	-.30	-.34	-.48

Note. Significant correlations are represented in bold ($p < 0.05$). VOCI-O = Vancouver Obsessional Compulsive Inventory–Obsessions Subscale; VOCI-CH = Vancouver Obsessional Compulsive Inventory–Checking Subscale; VOCI-CO = Vancouver Obsessional Compulsive Inventory–Contamination Subscale; SPQ = Schizotypal Personality Questionnaire; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; MCSD = Marlowe-Crowne Social Desirability Scale (form C).

RESULTS

Means, Standard Deviations, and Intercorrelations

Means, standard deviations, and intercorrelations of Study 2 are represented in Table 3. The VOCI-O, VOCI-CH, and VOCI-CO were correlated moderately to strongly related with each other. The VOCI-O showed the strongest relationships with the SPQ and the BDI. The BAI was correlated moderately to all OC-related measures. Both the VOCI-O and the SPQ were negatively related to social desirability as measured by the MCSD.

The Frequency of Confabulatory Introspection

Seventy-six participants completed the adapted CBT task. Like in the previous study, a small number of participants provided reasons for the original choice without correcting their answer. These were excluded from further analysis leaving a final sample of 70 participants. Of those participants, there were 14 participants who provided reasons for the switched choice they had not made, thereby showing evidence of confabulatory introspection. The remaining 56 participants changed their answer, assuming they had a mistake earlier, and did therefore not confabulate when providing reasons. In comparison to Study 1, the frequency of confabulation in the adapted CBT task is thus substantially lower (20.0% versus 55.8%).

Debriefing

The occurrence of confabulation was confirmed during debriefing. All participants responded affirmatively to the first question that they would notice their choice having been switched in a hypothetical follow-up study. With regards to the second question, as to whether they had noticed their answer had been switched in the current study, all of those who confabulated responded they had not no-

TABLE 4. Differences Between Those Who Confabulated and Those Who Did Not Confabulate on Self-Report Measures in Study 2

	No Confabulation (<i>n</i> = 55)		Confabulation (<i>n</i> = 14)		<i>F</i>	<i>p</i>
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)		
VOCI-O	2.76	(3.99)	5.14	(5.71)	3.30	0.074
VOCI-CH	1.49	(2.62)	3.64	(5.29)	4.72	0.033
VOCI-CO	2.35	(3.80)	3.17	(9.48)	17.01	0.000
SPQ	11.35	(9.18)	13.29	(10.00)	0.48	0.490
BAI	5.58	(5.96)	7.43	(11.07)	0.72	0.397
BDI	5.49	(6.22)	10.36	(9.85)	5.28	0.025
MCSD	7.62	(3.12)	7.35	(3.10)	0.08	0.781

Note. VOCI-O = Vancouver Obsessional Compulsive Inventory–Obsessions Subscale; VOCI-CH = Vancouver Obsessional Compulsive Inventory–Checking Subscale; VOCI-CO = Vancouver Obsessional Compulsive Inventory–Contamination Subscale; SPQ = Schizotypal Personality Questionnaire; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; MCSD = Marlowe-Crowne Social Desirability Scale (form C).

ticed. In other words, the occurrence of confabulatory introspection could not be explained by noticing the item had changed and subsequently providing reasons for the choice they had made to merely please the experimenter.

Demographics Variables and Confabulation

Chi-square analysis did not reveal any significant differences in gender or educational level between participants who confabulated, and those who did not. However, there was a trend for males to confabulate more than females (31.8% vs. 14.7%; Pearson's Chi Square = 2.80; $p = 0.09$). Like in Study 1, those who confabulated were older than those who did not, but an independent samples *t*-test showed the difference to be nonsignificant ($M = 43.5$ vs. 34.8), $t(68) = 1.67$; $p = 0.114$.

The Relationship of Confabulation with OC Symptoms and Other Measures

Differences on OC symptoms and the other measures between those who confabulated and those who did not are represented in Table 2. A MANOVA with two-tailed comparisons with all dependent variables entered simultaneously showed a highly significant overall effect, $F(7, 61) = 3.31$; $p < 0.001$. For the OC-related measures, test of between-subject effects showed a significant effect of confabulation on the VOCI-C, $F(1, 67) = 4.72$; $p = 0.03$, and the VOCI-CO, $F(1, 67) = 17.01$; $p < 0.001$. There was trend for those who confabulated to score higher on the VOCI-O, $F(1, 67) = 3.30$; $p < 0.074$. In addition, those who confabulated scored significantly higher on the BDI, $F(1, 67) = 5.28$; $p < 0.025$, but not on the BAI, $F(1, 67) = 0.73$; $p < 0.397$. There was no significant difference on the SPQ, $F(1, 67) = 0.48$; $p < 0.490$, or the MCSD, $F(1, 67) = 0.08$; $p < 0.781$.

To investigate the effect of confabulation on OC symptoms independent from negative mood states, an additional MANOVA was run with the BAI and BDI entered as covariates and the VOCI subscales as dependent variables, which showed a highly significant overall effect, $F(3, 63) = 6.97$; $p < 0.001$. Moreover, the effect

of confabulation on the VOICI-C, $F(1, 65) = 4.28$; $p < 0.042$, and the VOICI-CO, $F(1, 65) = 19.42$; $p < 0.001$, remained significant. However, the trend effect of confabulation on the VOICI-O disappeared, $F(1, 65) = 0.66$; $p < 0.42$.

SUMMARY

Study 2 confirmed the viability of the choice blindness task to measure differences in introspective access although the frequency of confabulation was much lower using the adapted choice blindness task with a different item. Results also showed that confabulatory introspection may be relevant symptoms of OCD other than (repugnant) obsessions with a significant effect of confabulation on checking and contamination. These results remained significant when controlling for negative states. Unlike Study 1, however, the occurrence of confabulation was no longer associated with schizotypy and obsessions as measured by the VOICI.

DISCUSSION

The current study is the first to investigate choice blindness and confabulatory introspection in relation to clinical symptoms. The study utilized a validated paper and pencil choice blindness task adapted from Hall, Johansson, and Strandberg (2012) to measure the occurrence of choice blindness and confabulatory introspection in a nonclinical sample. It was hypothesized that those who were prone to confabulatory introspection reported more OC symptoms, especially with respect to obsessive thoughts. The results partially supported these expectations.

Study 1 showed a significant relationship between confabulatory introspection with obsessions. However, there was no significant relationship of confabulation with checking and compulsions, and the relationship with obsessions was not independent from levels of depression. In contrast, Study 2 showed a significant relationship of confabulation with checking and contamination, but not with obsessions. The relationship with checking and contamination was independent from negative mood states. As such, while these results show evidence for the relevancy of confabulatory introspection for OC symptoms, and even specificity in the case of contamination and checking, the results provide a divergent pattern of relationships across the two studies.

The most likely explanation for the current results lies in the use of the item that was used to measure the occurrence of confabulatory introspection, which was the only difference between both studies. Specifically, the item used in Study 1 was related to social perception, involving an interpretation of the expression on people's faces, and although perhaps relevant to obsessions involving harm to others, is not as thematically relevant to checking and washing compulsions. This could also explain the strongly significant relationship between confabulation and schizotypy found in Study 1, and the complete absence of such a relationship in Study 2. While commonly associated with delusional thinking and disorganized

thought, schizotypy is also characterized by problems in the social sphere and difficulty with interpreting ambiguous social cues (see Claridge et al., 1996). Indeed, post-hoc analysis on the subscales of the SPQ showed the strongest relationships of confabulatory introspection with “constricted affect” and “lack of close friends.” It is not difficult to see how limited introspective access in social domains is associated with these specific symptoms.

The thematic nature of obsessive-compulsive symptoms has been noted before, where people with OCD tend to develop symptoms in areas of life where they lack confidence, or which otherwise hold importance to the person (Doron, Kyrios, & Moulding, 2007; O’Connor, 2002; Rachman, 2003). In particular, fear-of-self perceptions have recently been highlighted as being particularly relevant to the occurrence of repugnant obsessions (Aardema, Radomsky, Doron, Allamby, & Souki, 2013). Similar processes may apply to confabulatory introspection as well, where introspective access is more limited in relation to the specific symptoms people experience. If so, the further development of an experimental choice blindness task focused on specific OC-relevant domains might reveal an even stronger link with OC symptoms than found in the current study. For example, CBP tasks specifically tailored around self-perception might yield more definitive results with respects to the relationship between introspective access and repugnant obsessions such as “I might be dangerous” or “I might be insane.” Of course, the current tasks did involve self-perception to some extent, where people were asked to introspect and provide reasons for a choice they did not make. However, the choice itself did not directly pertain to the type of self-evaluations deemed particularly relevant to the aforementioned repugnant obsessions (Aardema et al., 2013). In this regard, the stronger relationship of confabulatory introspection with checking and contamination in Study 2 is especially noteworthy. Both these symptoms are more commonly associated with a preoccupation about an external states of affairs in reality (e.g., “the door might not be probably closed”; “the table might be contaminated”; Lee & Kwon, 2003), in line with the content of the item used in Study 2. As such, the further development of choice blindness tasks within specific domains could be a fruitful avenue for further research.

Rather than domain specificity influencing the effect of confabulation on specific symptoms, another possibility accounting for the differential relationships across both studies deserves to be mentioned as well. The frequency of confabulation was much lower with the switched choice in Study 2 (20.0%) than the switched choice used in Study 1 (55.8%) Moreover, the relationship of confabulatory introspection with OCD symptoms was generally stronger than in Study 1. As such, not only does this highlight the potential effect of content on the frequency of confabulation, it may also suggest that the relationship between confabulation and OC symptoms becomes more apparent in situations where a tendency to confabulate would generally be “less normal.” In terms of the development of further tasks, therefore, when piloting different item content, a lower rate of confabulation in the general population might be more preferable in order to reveal

relationships with clinical symptoms. Again, this is an area for further study and research not uncommon in labor-intensive experimental research.

While the current study found limited evidence for the specificity of confabulatory introspection to symptoms of OCD independent from anxiety and depression, introspective access was clearly relevant to depression as well. This confirms recent findings that those with choice blindness score higher on symptoms of depression (Hooper, McHugh, Hopthrow, Tekin, Iskin, & Ilkman, submitted). In addition, depending on the choice people were asked to provide reasons for, those who scored higher on schizotypy were more likely to confabulate. The occurrence of confabulatory processes in the wider schizotypal spectrum has been noted before, and the current results confirm these observations (Langdon & Turner, 2010). In this regard, another future research area that deserves mentioning is the potential role of confabulatory introspection in treatment outcome where poor insight acts as a negative predictor of treatment outcome. Schizotypy itself has been linked to obsessive-compulsive symptoms, both in terms of its relationship with obsessive-compulsive disorder, as well as a negative predictor of treatment outcome for OCD (Aardema & Wu, 2011; Catapano et al., 2010; Moritz et al., 2003). Similar problems have been identified in the treatment of delusions and psychosis, another condition where cognitive insight is often compromised (Beck & Warman, 2004). In the absence of introspective access, cognitive interventions may not be as effective as they could be, regardless of the particular disorder that is being treated.

Despite positive findings, there are limitations to the current study. The results do not directly comment on the causes of confabulatory introspection, nor does limited introspective access provide a causal explanation for symptoms. CBP is naturally linked with information processing models, partially inspired by the notion of “change blindness” where the person fails to notice perceptual changes in the environment (Grimes, 1996). Disruption in memory, imagination, inattention, or other motivational factors all might play a role in the occurrence of confabulatory introspection. Aside from social desirability, which could not account for the results, the current studies did not attempt to isolate all potential factors involved with the occurrence of confabulatory introspection.

Related to the above, the current study is also limited by the use of a nonclinical sample, which does not automatically generalize to clinical samples, despite targeting continuous dimensions of symptoms (Mataix-Cols, Rosario-Campos, & Leckman, 2005). There is evidence that OC-relevant phenomena are common in nonclinical groups, and that subclinical OC experiences are similar in content and structure to OCD symptoms proper (Burns, Formea, Keortge, & Sternberger, 1996; Tolin, Woods, & Abramowitz, 2003). However, results still require replication in clinical samples with elevated levels of distress and OC symptoms. Until such time, these findings should be regarded as preliminary. At the same time, the study highlights a potentially fruitful new area of clinical investigation that may shed light on some long-standing questions about insight, introspection, and cognitive access in clinical psychology.

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