

## Fight Fire with Fireflies! Association Splitting: A Novel Cognitive Technique to Reduce Obsessive Thoughts

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**Abstract.** A novel cognitive technique, termed “association splitting”, aimed at reducing obsessive thoughts, is introduced. Association splitting draws upon the so-called “fan effect” of associative priming. Transposing this principle to the treatment of obsessive-compulsive disorder (OCD), we hypothesize that the sprouting of new and the strengthening of existing neutral associations to core OCD cognitions will reduce their fear-evoking properties by depriving the chain of OCD-related cognitions of associative strength. To test the feasibility and efficacy of this approach, an internet intervention study was implemented. Initially, 38 subjects with OCD obsessions took part in a survey. After completion of the survey they were then sent a self-help manual. Three weeks later, participants were re-contacted. One-third of the participants responded to the treatment (at least 35% decline on the Y-BOCS scale). The completer analysis revealed a response rate of 42%. It is suggested that association splitting may lead to symptom relief in a subgroup of participants and may represent a useful addition to the tool box of cognitive-behavioural techniques.

*Keywords:* Obsessive-compulsive disorder, obsessions, cognitive therapy, outcome.

### Introduction

Despite marked advances regarding both psychopharmacological and psychotherapeutic treatment of obsessive-compulsive disorder (OCD), response rates have remained at best modest compared to those obtained for other anxiety disorders. In recent years, behavioural approaches, most notably exposure therapy, have been complemented with a number of cognitive treatment techniques. Treatment trials on the efficacy of cognitive techniques have yielded promising results that sometimes equalled the results of exposure therapy alone. In the following, a novel cognitive technique, termed association splitting, targeting intrusive thoughts (obsessions) is introduced.

Association splitting is based on a semantic network understanding of human information processing (Reisberg, 2001). Semantic network models propose that cognitions (i.e. mental events such as memory episodes, words, images) are stored in the cortex according to their (semantic) relatedness. For example, a plethora of studies has elucidated the existence of specialized cortical areas storing items according to their visual or functional properties. Cognitions within a semantic network communicate via spreading activation, which on a neural level corresponds with electric impulses exchanged between cells. A further principle of

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semantic network models is that with increasing co-occurrence of cognitions the corresponding associative connection is strengthened.

One aspect of semantic networks, central to our approach, is that reciprocal connections between cognitions are not necessarily equivalent in strength. Although most related cognitions mutually energize each other, dissociations or one-way associations are also common, such is the case for superordinate and subordinate items (e.g. *pheasant* will prime the superordinate category *bird* more strongly than vice versa). It is our clinical observation that such one-way associations are prevalent in obsessive ideas: *Libra* will more easily activate associations about *cancer* (illness!) than vice versa! With increasing illness duration, obsessions tend to generalize and *infiltrate* neutral or slave associations that will in turn prime obsessions. Thus, strong one-sided associations (i.e. cognitive *black holes*) evolve over time; for example, one of our patients when spotting a rose created the following associative chain: *rose – red – blood – might harm someone*.

Association splitting rests on a principle of semantic priming first described by Anderson (1974). In short, the entire associative strength of a cognition is considered to be a) limited and b) its sum activation is divided by neighbouring cognitions. Hence, increasing the number of associations for a given cognition automatically reduces the strength of the other associations. This phenomenon is termed the “fan effect”. Transposing this principle to obsessive beliefs, it is predicted that the sprouting of new meaningful associations to OCD cognitions and the strengthening of “buried” ones that are neutral or positive in content, respectively (e.g. *knife – spoon*), will both divert attention from OCD cognitions towards neutral associations and decrease the strength of obsessive cognitions via the fan effect (see Methods section for a description of the technique). This in turn is hypothesized to empower patients to resist their cognitions. The goal of the present study was to assess the safety, feasibility, and efficacy of our novel approach. It was predicted that the application of the technique would lead to a significant attenuation of obsessive thoughts in a subgroup of participants.

## Methods

### Manual

The technique is described in a self-help manual (Moritz, 2006), which can be obtained via the following link: [http://www.uke.uni-hamburg.de/kliniken/psychiatrie/index\\_31780.php](http://www.uke.uni-hamburg.de/kliniken/psychiatrie/index_31780.php). After the introduction, the reader is thoroughly familiarized with the semantic network approach. This principle is then applied to obsessive thoughts, including figures that highlights the underlying illness model (i.e. cognitive chains relating to OCD chains with strong associations to neighbouring OCD cognitions, but crippled ties towards neutral cognitions). In the following, instructions for the application of the technique are provided along with practical examples. Participants are instructed to identify two to three basic cognitions within their obsessive chains that are at the heart of their obsessive thoughts, each capturing a distinct aspect of the cognition. For example, a participant in the pilot study worried that her mother might die if she came across the number “66”. She picked “mother” and “66” as her core obsessive cognitions. The patient is encouraged to find non-OCD associations semantically related (in this case, e.g. *mother – father*), associatively meaningful (e.g. *66 – route 66*), rhyming (e.g. *mother – other*) or personally relevant (e.g. *mother(s of invention) – Frank Zappa*). Meaningless associations were discouraged as associative ties are likely to remain weak. The OCD cognition should

be thought or named first, immediately followed by the neutral cognition. The associations could be words, short sentences, pictures or refrains from songs (“Life starts when you are turning 66” – popular German song by Udo Jürgens). Cognitions should not be semantically intertwined with the OCD belief (e.g. *cancer – doctor*), as the latter may fuel rumination and trigger the obsessive cascade. Participants were instructed to imagine and rehearse the associative pairs (OCD cognition – neutral association) for approximately 10 minutes over the course of each day. This new therapeutic approach was considered ethically inoffensive by the ethics committee of Hamburg.

### *Participants*

At two internet forums for OCD, the first author posted an invitation to participate in an internet-based self-help trial aimed at reducing obsessive thoughts. Subjects were asked to refrain from participation if they did not experience obsessive thoughts, did not regard their obsessional fears and worries to be at least exaggerated (low illness insight), had no time to perform the exercises in the course of the following 3 weeks, or did not agree to participate in a survey before and after the intervention. A web-link was then provided for those willing to participate.

The internet-based questionnaire at the pre-intervention phase consisted of the following sections: introduction, sociodemographic questions, the Maudsley Obsessive Compulsive Inventory questionnaire (MOCI), the Yale-Brown Obsessive-Compulsive Scale self-report scale (Y-BOCS), and the Beck Depression Inventory (BDI). At the beginning of the Y-BOCS section, examples were given for obsessions and compulsions. On the final page, participants were asked to enter a code word, again required at the post-intervention phase, as well as their e-mail address. A treatment manual was sent to participants via e-mail attachment within 24 hours. Patients were given the e-mail address of the first author and promised that every e-mail would be replied to within 24 hours (in fact, a reply was sent within 6 hours).

Three weeks after the dispatch of the manual, participants were sent a second link via e-mail and invited to take part in a second evaluation. This assessment contained the same questionnaires as above. Those participants who confirmed they had read the manual were administered a number of questions, including subjective efficacy of the technique, comprehensibility of the manual, symptom worsening during the last weeks, and motivation to administer the technique in future. In case the intervention was effective, participants were asked at which particular day it began to exert a positive influence on their symptomatology.

### *Subjects*

Thirty-eight participants completed the first assessment. Of these, six subjects did not complete the second assessment. These were reminded in a friendly manner several times but did not respond, except for one participant who reported strong symptom relief, which, however, could not be attributed to the application of the technique.

### *Strategy of data analysis*

The present study was analysed both by means of intention-to-treat (ITT) and a per protocol analysis (PP). Two participants were dropped from the ITT analysis ( $N = 30$ )

**Table 1.** Psychopathological data at baseline and after intervention (intention-to-treat sample,  $N = 30$ )

Variable	Baseline	Post	Statistics
Y-BOCS total	19.73 (6.47)	15.70 (7.46)	$t = 4.36, p < .001; d = .58$
Y-BOCS obsessions	11.23 (2.98)	8.83 (3.38)	$t = 4.76, p < .001; d = .75$
Y-BOCS compulsions	8.50 (5.02)	6.87 (5.12)	$t = 3.32, p = .002; d = .32$
BDI	16.59 (8.23)	14.14 (9.26)	$t = 2.26, p = .03; d = .28$
MOCI checking	4.45 (1.55)	3.66 (1.76)	$t = 2.17, p = .04; d = .48$
MOCI washing	4.48 (3.09)	3.55 (2.96)	$t = 2.31, p = .03; d = .31$
MOCI slowing	3.59 (1.52)	2.97 (1.57)	$t = 2.35, p = .03; d = .40$
MOCI doubt	4.34 (1.40)	3.90 (1.59)	$t = 2.36, p = .02; d = .29$
MOCI aggression	1.79 (0.41)	1.66 (0.61)	$t = 1.28, NS; d = .25$

as they did not read the manual (12 males, 18 females; age: 35.00 ( $SD$ : 9.04); number of previous hospitalizations: 3.00 ( $SD$ : 1.44)). Six participants who affirmed reading the manual but conceded not performing the exercises due to lack of time were dropped for PP analysis ( $N = 24$ ). Of the ITT sample, 18 were prescribed antidepressant medication. Twelve participants reported additional anxiety diagnoses, 10 reported depression, and one each reported presence of PTSD and bipolar disorder.

### Results and discussion

The present results provide first evidence that association splitting is both a safe and efficient method to reduce OCD symptoms. Table 1 shows a significant symptom decline emerging on all subscales except for the MOCI aggression subscale. A medium to strong effect size was found for the Y-BOCS obsession subscore. Ten of the 30 participants from the ITT sample (i.e. 33%) confirmed a substantial symptom decline subject to the application of association splitting (subjective efficacy). Again, 10 participants displayed a Y-BOCS decline of 35% or more (objective efficacy). The per protocol (PP) analysis revealed a response for 42% of the sample. Only one participant showed a marked symptom worsening, which according to the participant was due to family problems and unrelated to intervention.

Seventy-seven percent of the participants ( $n = 23$ ) reported the technique was applicable as a self-help intervention. Twenty-eight participants confirmed that the manual was written in a comprehensible manner (i.e. 93%). Fourteen participants (47%) experienced symptom relief within 7 days, 8 participants noted the effect later (27%), and another 8 participants reported no effect at all. Twenty-five participants (86%) said they would continue to adopt the method in future.

Although the observed response rate is not particularly impressive when contrasted with rates obtained using cognitive-behavioural psychotherapy with/or without adjunctive antidepressant agents, it should be kept in mind that only a single technique was applied, which was not embedded in a comprehensive psychotherapeutic or clinical setting.<sup>1</sup> Moreover, association

<sup>1</sup> It is difficult to weigh the contribution of specific (CBT, antidepressant medication) versus unspecific factors for positive outcome rates in comprehensive treatment programs. Such unspecific factors encompass occupational therapy, social therapy as well as social support by other patients (e.g. company with other patients, experiencing OCD as a collective fate (a problem shared is a problem halved), being in a "safe" environment etc).

splitting does not intend to be a competing cognitive intervention or substitute for existing techniques but an easy-to-administer adjunct intervention, particularly for response prevention techniques, which are known to be less successful in the treatment of obsessions than compulsions. Association splitting may be particularly useful for OCD patients unresponsive or repellent to other cognitive techniques.

Several limitations of the present study that render the results preliminary have to be mentioned. The study did not implement a random trial with a formal control group to assess base rates of symptom development over time. Moreover, participants' symptomatic status was not verified via external clinical interviews. With respect to the latter point, several pieces of evidence encourage us to assume that participants' symptom descriptions were indeed valid and that participants were primarily suffering from obsessive thoughts. First, the internet forums were exclusively developed for OCD sufferers who had registered as members. Thus, it is unlikely that healthy subjects or patients with psychiatric diagnoses other than OCD have participated. Further, both the English and German self-report version of the Y-BOCS yield good to excellent agreement with the original clinician-administered form. There is also ample evidence that self-report responses obtained from internet studies are comparable in reliability to paper-and-pencil administration (Chinman, Young, Schell, Hassell and Mintz, 2004; Meyerson and Tryon, 2003; Ritter, Lorig, Laurent and Matthews, 2004). In our view, the anonymous design of the study may have produced a more conservative estimate of treatment response. A final flaw of the study is that we were unable to evaluate the quality of the participants' associations. At this point we can only speculate that, with the help of a therapist, the efficacy of this technique could be raised further, which is the objective of an ongoing trial. It also needs to be established, whether the obtained effects are short-term or can be maintained long-term.

In conclusion, association splitting seems to be effective in 33–42% of persons suffering from obsessions and may represent a useful adjunct to cognitive-behavioural intervention.

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