

**Text 1. The Enhancement of Visuospatial Processing Efficiency Through Buddhist Deity Meditation**

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Tibetan Buddhist meditative techniques are thought to enhance not only overall mental functioning, but also specific cognitive processes such as attention, perception, or mental imagery. According to prominent Buddhist scholars (e.g., the Dalai Lama's and Matthieu Ricard's quotes from the 2003 Investigating the Mind meeting, cited in Barinaga, 2003), there are accomplished Buddhist practitioners  
5 who have developed exceptional imagery skills to the extent that they are able to maintain complex religious images in visuospatial working memory for minutes, sometimes hours, without noticeable degradation. During the Investigating the Mind Conference at the Massachusetts Institute of Technology in 2003, Buddhist monks and Western scientists engaged in lively exchanges concerning the credibility of such claims. According to the psychological view on imagery (e.g., Kosslyn, 1994), maintaining an  
10 image for such a long time is impossible, as images fade in a matter of seconds because of the limited capacity of working memory resources.

The main goal of this study was to investigate the effects of different styles of Buddhist meditation on such imagery abilities as dynamic manipulation of spatial information and maintenance of a complex image in visuospatial working memory. The claims of Buddhist monks regarding their exceptional  
15 capacity for visuospatial memory, if true, would radically change current theories of mental imagery and have profound practical implications. There has been evidence indicating that it is possible to improve individual performance on higher-order spatial-imagery tasks that require dynamic manipulation of stimuli (e.g., mental rotation) by playing action video games or by manipulating a variety of spatial stimuli. However, the extent to which maintenance of a static image in visuospatial working memory  
20 can be enhanced is largely unknown. Several neuroimaging studies have found that repeated practice leads to changes in brain activation in the areas involved in performing visuospatial working memory tasks (e.g., ventral and dorsal frontal regions), and such results suggest training-induced plasticity. These changes, however, occurred mostly for tasks related to maintenance of information about an object's spatial location, rather than tasks related to maintenance of information about an object's visual  
25 appearance. Other studies on the enhancement of image maintenance have primarily been limited to pharmacological manipulations, such as dopaminergic modulation of working memory. However, improving image maintenance by nonpharmacological methods, such as special types of meditation, would have both theoretical and practical appeal.

We conducted a phenomenological analysis of a variety of Tibetan meditation techniques, using Giorgi's  
30 (1970) descriptive method, and identified two types of meditation, *Deity Yoga* (DY) and *Open Presence* (OP) that are diametrically opposed in their utilization of imagery.

DY, also known as self-generation-as-deity, originated in Hindu and Buddhist Tantric traditions in India and was later adopted by Tibetan Buddhism. The practice involves holding the focus of attention on an internally generated image of a deity surrounded by his or her entourage. The content of DY is

35 rich and multimodal, requiring generation of a colorful three-dimensional image (e.g., the deity's body, ornaments, and environment), as well as representation of sensorimotor body schema, feelings, and emotions of the deity. The image temporarily replaces one's sense of self and internal perception of the real world. On the most basic level, DY is described as worship of a particular deity who possesses superhuman attributes. On a more advanced level, DY is a self-transformational practice aimed at  
40 overcoming neuroses by cultivating the positive cognitive and affective states associated with the deity. Finally, it is believed that by generating a mind-set of a deity, one can realize a state of pure awareness (i.e., nonconceptual awareness).

Open Presence (OP) refers to a complex of meditation practices that originated centuries ago among advanced Buddhist meditators in Tibet who believed that pure awareness cannot be developed through  
45 conceptually constructed practices such as DY. In addition to not using imagery, the OP meditator aspires to achieve awareness devoid of conceptualization. OP involves evenly distributed attention that is not directed toward any particular objects or experiences. Although various aspects of experience (e.g., thoughts, feelings, or images) may arise spontaneously, one is instructed to let them subside on their own accord, without letting the mind dwell on or analyze them.

50 According to cognitive research, selective attention facilitates control over the content of working memory and must be engaged throughout the entire period of active image maintenance to efficiently keep visuospatial information in mind. DY combines the engagement of selective visual attention with active maintenance of an image of a deity; thus, we hypothesized that DY would lead to enhancement of visuospatial working memory, resulting in improved performance on imagery tasks.

55 Although some teachings recommend practicing OP without the involvement of conceptually constructed practices, a variety of Buddhist traditions combine DY and OP, whether within a single session or over the course of a practitioner's training. As a consequence, most experienced Tibetan meditators are familiar with both practices. It was therefore impossible to make a direct comparison between meditators who had experience in only DY and those who had experience in only OP. A within-subjects  
60 design was also not feasible because, over time, meditators often become adept in one specific style of their choice. Considering these complexities, we used a 5 (group: DY, OP, and three control groups) × 2 (pretest vs. posttest) between-subjects experimental design.

There were five groups of participants: two meditation groups (DY and OP) and three control groups (one group of meditators and two groups of nonmeditators). Meditators assigned to the DY, OP, and  
65 meditators control groups had to meet the following criteria: First, they had to identify themselves as accomplished meditators in at least one of the target types of meditation. Second, they had to have practiced their preferred style of meditation for at least 10 years and to have completed meditation retreats of various lengths for a cumulative total of at least 1 year. Finally, they had to be nominated by their meditation communities and their teachers as accomplished meditation practitioners.

70 Participants were assigned to DY or OP groups in accordance with their indicated preferred meditation style. Three participants (2 in the DY group and 1 in the OP group) were monks tested at the Shechen Monastery (Nepal). Eighteen participants (13 in the DY group and 5 in the OP group) came from the extended communities of Tibetan Buddhists in upstate New York, and 8 participants in the OP group were practitioners from the Nyingma Institute and Rigpa Fellowship in San Francisco, California. The

75 participants in the meditators control group were practitioners tested at Shechen and Triten monasteries (Nepal); 4 of them indicated preference for OP, and 9 for DY. The participants in the two other control groups were students from Rutgers University and older adults from upstate New York.

Seventy-one participants completed the study. The DY group consisted of 5 females and 10 males (mean age = 42 years; mean meditation experience = 13 years). The OP group consisted of 4 females  
80 and 10 males (mean age = 46 years; mean meditation experience = 15 years). The meditators imagery control group consisted of 4 females and 9 males (mean age = 37 years; mean meditation experience = 11 years). The nonmeditators imagery control group consisted of 7 females and 7 males (mean age = 41 years), and the nonmeditators resting control group consisted of 11 females and 4 males (mean age = 42 years).

85 The participants were administered two computerized tasks assessing different aspects of visuospatial processing: a mental rotation task (MRT) that assessed their ability to dynamically transform and compare two spatial objects and a visual memory task (VMT) that assessed their ability to maintain images of complex static objects in visuospatial working memory.

On each trial of the MRT, participants viewed a pair of two-dimensional pictures of three-dimensional  
90 forms. The forms in each pair were rotated relative to each other around the  $x$ -,  $y$ -, or  $z$ -axis. Across trials, the amount of rotation ranged from  $40^\circ$  to  $180^\circ$ , in  $20^\circ$  increments. Participants judged whether the forms in the pair were the same or mirror-reversed. There were 36 test trials.

The VMT consisted of two parts. There were six test trials in the first part of the VMT. On each trial, participants were exposed to a single image that appeared for 5 s. This display was replaced by an array  
95 of six images: five distractors and the previously shown image. Participants were asked to determine which image in the array was the previously shown image. There were 18 test trials in the second part of the VMT. On each trial, participants viewed an array of seven images that appeared for 8 s. This array was replaced by another array of seven images: six of the previously studied images and one novel image. Participants were asked to judge which image in the second array was not present in the first.

100 The participants in both imagery control groups completed the Embedded Picture Test (EPT) and the Perspective Taking Test (PTT). In the EPT, participants viewed line drawings of common objects (e.g., a piano) for 4 s. After each drawing was presented, participants were given a 4-s period during which to imagine the drawing and then had to decide whether an orally presented property (e.g., "symmetry", "arrow junction") was present in that drawing. There were 16 test trials.

105 On each trial of the PTT, participants viewed a map on a computer screen. The map showed a starting location (a character's head or an arrow) and five other locations (university, airport, etc.). Participants were to imagine transforming their actual perspective to that of the character and then click on a button indicating a target location from the on-screen character's perspective. There were 58 test trials.

All the participants were tested individually, in a testing session lasting 1.5 to 2 hr. First, the participants  
110 completed the MRT and VMT pretests, the order of which was counterbalanced across participants. For those participants who did not speak English, a Tibetan-English interpreter translated all instructions into Tibetan before each test began. The meditators were asked to report the lengths of their experience

in OP and in DY in months. After completing the pretest, the participants from the DY group were asked to perform DY, and the participants from the OP group practiced OP meditation. Both groups meditated  
 115 for 20 min. This time period was chosen because meditators indicated that this should be enough time to reach an appropriate meditative state. The two imagery control groups completed the EPT and PTT during the intervening period, while the third control group rested. Immediately after the intervening period, the subjects completed the MRT and VMT posttests.

First, we compared the five groups of participants on their pretest MRT and VMT performance to identify  
 120 any baseline differences between meditators and nonmeditators. For the VMT, analysis of variance (ANOVA) indicated that the groups did not differ significantly in RT ( $F < 1$ ), but differed marginally in accuracy,  $F(4, 64) = 2.57, p = .05$ . Pair-wise comparisons (corrected using Tukey's honestly significant difference) revealed that the OP group performed marginally more poorly than the resting control group ( $p = .11$ ), but all other differences between groups were not significant. For the MRT, there were no  
 125 differences between the groups in either RT or accuracy ( $F < 1$ ).

Next, we performed hierarchical regression analyses to examine the effect of the length of participants' previous experience in DY versus OP on their performance on imagery tasks. The length of DY experience did not have a significant effect on accuracy in the VMT pretest,  $r(40) = -.13$ ; the VMT posttest,  $r(40) = .22$ ; the MRT pretest,  $r(40) = -.13$ ; or the MRT posttest,  $r(40) = .06$ ; all  $ps > .05$ . Likewise, the length  
 130 of OP experience did not have a significant effect on accuracy in the VMT pretest,  $r(40) = .09$ ; the VMT posttest,  $r(40) = -.20$ ; the MRT pretest,  $r(40) = -.26$ ; or the MRT posttest,  $r(40) = -.11$ , all  $ps > .05$ . The interaction between the length of DY experience and the length of OP experience was not significant for VMT or MRT accuracy, all pre- and posttest  $Fs(3, 36) < 1$ . Similarly, the length of DY experience did not have a significant effect on RTs in the VMT pretest,  $r(40) = -.10$ ; the VMT posttest,  $r(40) = -.06$ ; the MRT  
 135 pretest,  $r(40) = -.06$ ; or the MRT posttest,  $r(40) = -.10$ ; all  $ps > .05$ . In addition, the length of OP experience did not have a significant effect on RTs in the VMT pretest,  $r(40) = .17$ ; the VMT posttest,  $r(40) = -.03$ ; the MRT pretest,  $r(40) = -.06$ ; or the MRT posttest,  $r(40) = .03$ ; all  $ps > .05$ . There were no significant interaction effects between the length of DY experience and the length of OP experience for VMT and MRT RTs, all pre- and posttest  $Fs(3, 36) < 1$ .

140 In order to avoid confounds arising from speed-accuracy trade-offs, we created a measure of *visuospatial processing efficiency* for each imagery test, dividing each subject's proportion of correct responses by his or her average RT. A logarithmic transformation ( $\ln RT$ ) was used to normalize the RT data that were positively skewed.

### MRT

A 2 (time: pretest vs. posttest)  $\times$  5 (group) mixed-model ANOVA yielded a significant main effect of  
 145 time,  $F(1, 64) = 21.22, p < .001, \eta^2_p = .249$ . The effect of group was not significant,  $F < 1$ . However, there was a significant Group  $\times$  Time interaction,  $F(4, 64) = 6.11, p < .001, \eta^2_p = .276$ . Follow-up ANOVAs revealed a highly significant increase in efficiency from the pretest to the posttest for the DY group,  $F(1, 14) = 19.36, p < .001, \eta^2_p = .58$ , and a marginally significant increase for the nonmeditators imagery control group,  $F(1, 11) = 4.43, p = .06$ . There was no significant increase for  
 150 the OP group,  $F(1, 13) = 2.02, p = .18$ ; the meditators imagery control group,  $F(1, 12) < 1$ ; or the resting control group,  $F(1, 14) < 1$ .

*VMT*

There was a significant main effect of time,  $F(1, 64) = 22.89, p < .001, \eta^2_p = .26$ . Although the main effect of group was not significant,  $F(4, 64) = 1.82, p = .13$ , the interaction was significant,  $F(4, 64) = 5.87, p < .001, \eta^2_p = .26$ . Follow-up ANOVAs revealed that the DY group showed a highly significant increase in efficiency (the value almost doubled) between the pretest and the posttest,  $F(1, 14) = 26.41, p < .001, \eta^2_p = .65$ ; the OP group showed a slight but significant increase,  $F(1, 13) = 5.70, p = .03, \eta^2_p = .30$ . There was no significant increase for either imagery control group or for the resting control group,  $F < 1$ . A one-way ANOVA revealed significant group differences on the posttest,  $F(4, 64) = 2.92, p = .02$ . In particular, the DY group became significantly more efficient than the OP group ( $p = .03$ ) and the meditators imagery control group ( $p = .04$ ).

The results of this study indicate that there is no baseline difference in imagery skills between meditators and nonmeditators, or between long-term practitioners of different styles of meditation. However, DY practitioners demonstrated a dramatic increase in performance on both image-maintenance and spatial tasks in the posttest (after they had meditated), in contrast to the other four groups. Therefore, DY specifically trains one's capacity to access heightened visuospatial memory resources via meditation, rather than generally improving long-lasting imagery abilities.

The finding that DY meditators have access to a state of heightened visuospatial resources has many implications for therapy, treatment of memory loss, and mental training. It points out that latent resources of the brain can be accessed and consciously activated. It also raises questions regarding the mechanisms involved in achieving this state. As mentioned in the introduction, the observed effect might be due to the involvement of focused visual attention during DY meditation; such attention is critical in facilitating control over the contents of visuospatial working memory.

The multimodal nature of DY, involving complex interactions between various systems, might provide the necessary foundations for the activation of heightened imagery capacities, resulting in a state of global coherence between different brain regions. Although similar synchronies might occur during imagery (nonmeditation) tasks, they are probably less pronounced, because of the differences in the duration of the temporal synchronization (i.e., trial by trial for visuospatial tasks vs. throughout a meditation session). This speculation could be investigated by comparing DY with meditation on less sophisticated visual stimuli, such as different colors or objects, which have less visual and emotional complexity than the image of a deity during DY meditation.

This emergence of heightened capacity as a particular mental state, and the process by which it is achieved, may be compared to processes in athletic training. While engaging in intense physical activity, athletes often report entering a state similar to that achieved by DY meditators, often termed "the zone". In this state, athletes' physical abilities exceed their normal capacities: The athletes exhibit enhanced speed in decision making, heightened attentional capabilities, and decreased fatigue. It is possible that the effects of meditation and "the zone" are similar in some respects, although the effects of meditation are related to heightened mental capacities, rather than heightened physical capacities. Further investigation of the relationship between these two phenomena would be required to evaluate this claim, and the results of such a study could have useful implications in developing training procedures that will produce effective access to latent physical and mental resources.

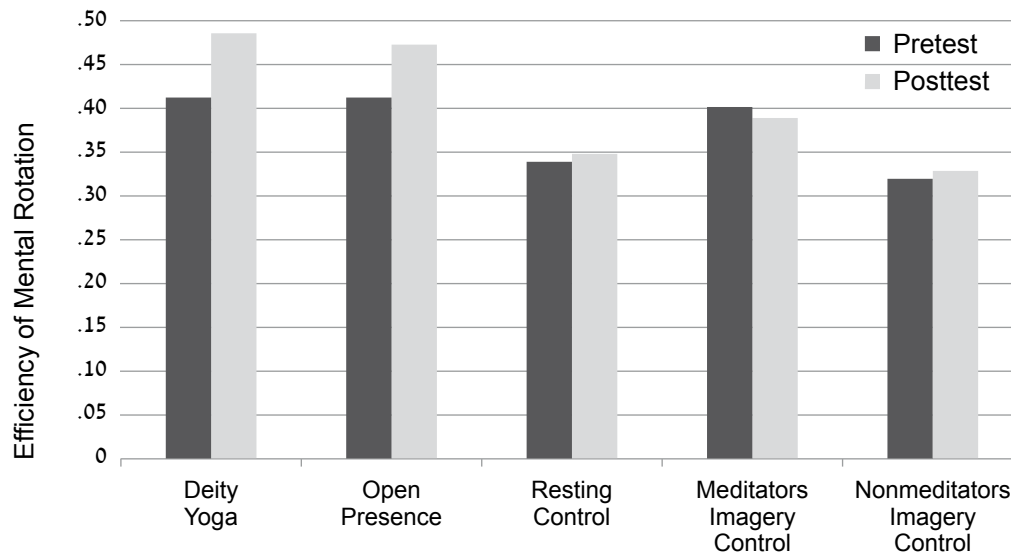
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1. מדוע השתמשו החוקרים בשני סוגי מדיטציה?  
 (1) כדי לבחון את השיפור בתפקודים קוגניטיביים שונים, שכן מדיטציית OP משתמשת במנגנונים קוגניטיביים של ניטור, ערנות וקשב מפוזר; בעוד שמדיטציית DY דורשת מיקוד קשב באובייקט אחד  
 (2) מכיוון שרוב העוסקים במדיטציה מתנסים במהלך האימון שלהם בשני סוגי המדיטציה הללו  
 (3) כדי לבחון האם ההשפעה של מדיטציה על יכולת הדמיה (imagery) היא כללית או תלויה שיטת מדיטציה  
 (4) כדי ליישב את המחלוקת בין נזירים העוסקים במדיטציית DY, הטוענים כי הם יכולים למקד את הקשב שלהם באובייקט למשך זמן ארוך מאוד, לבין נזירים העוסקים במדיטציית OP הטוענים כי הדבר אינו אפשרי
2. מה מטרת מבחני ה-EPT וה-PTT?  
 (1) למדוד יכולת לביצוע רוטציה מנטלית והשוואה בין שני אובייקטים; והיכולת לשמר תמונות מורכבות בזיכרון העבודה  
 (2) לבחון את היכולת לדמיין ציור שהוצג בפניהם ולזכור תכונות שהופיעו בו; ולבחון את היכולת לדמיין את נקודת המבט של דמות המצוירת במפה  
 (3) להוות מניפולציית ביקורת שמקבילה לביצוע 20 דקות מדיטציה  
 (4) להבחין בין אנשים בעלי יכולת הדמיה (imagery) גבוהה לכאלו עם יכולת הדמיה (imagery) נמוכה
3. איזו קבוצת ביקורת מיועדת לסייע לחוקרים למדוד את אפקט ה-test-retest?  
 (1) קבוצת "Resting control"  
 (2) קבוצת "Nonmeditators imagery control"  
 (3) קבוצת "Meditators imagery control"  
 (4) אף אחת מהקבוצות לא מיועדת למדוד את אפקט ה-test-retest והחוקרים יצטרכו להשתמש בשיטות סטטיסטיות כדי לנטרל אפקט זה
4. במידה והיה נמצא הבדל בין קבוצת הביקורת "Meditators imagery control" לבין קבוצת הביקורת "Nonmeditators imagery control", מה מהבאים בהכרח לא ניתן היה להסיק?  
 (1) ההבדל ביכולות הדמיה (imagery) נובע משינויים קוגניטיביים ומוחיים בעקבות תרגול מדיטציה רב שנים  
 (2) ההבדל ביכולות הדמיה (imagery) נובע מהבדלים בין תרבותיים בין מתרגלי מדיטציה ללא-מתרגלי מדיטציה  
 (3) לאימון הדמיה (imagery) באמצעות מטלות EPT ו-PTT יש השפעה שונה על מתרגלי מדיטציה לעומת חסרי ניסיון במדיטציה  
 (4) ההבדל ביכולות הדמיה (imagery) נובע מההשפעות קצרות הטווח של אימון מדיטציה

5. במידה והחוקרים לא היו משתמשים בקבוצת הביקורת "Meditators imagery control":
- (1) לא ניתן היה לדעת איזה סוג מדיטציה גורם לשיפור רב יותר ביכולות הדמיה (imagery)
  - (2) לא ניתן היה לדעת אם שיפור יכולות ההדמיה (imagery) נובע מאפקט קצר טווח או ארוך טווח של מדיטציה
  - (3) לא ניתן היה לדעת האם אימון הדמיה (imagery) יעיל לשיפור יכולות הדמיה (imagery)
  - (4) לא ניתן היה לדעת אם למספר השנים שעוסק אדם במדיטציה ישנה השפעה על מידת שיפור יכולת ההדמיה (imagery) שלו
6. מדוע החוקרים ביצעו את ניתוח הרגרסיה המתואר לפני ניתוח תוצאות מטלות ה- MRT וה- VMT (שורות 126 - 139)?
- (1) כדי לבדוק האם למשך הניסיון בתרגול מדיטציה יש השפעה שונה על ביצוע במטלת ה- MRT לעומת הביצוע במטלת ה- VMT
  - (2) כדי לבדוק האם יש קשר בין סוג תרגול המדיטציה לשיפור ביכולות ההדמיה (imagery)
  - (3) כדי לבדוק אם שתי קבוצות הניסוי (DY ו-OP) שונות זו מזו ביכולות ההדמיה (imagery) הבסיסיות שלהן
  - (4) כדי לבחון האם התוצאות שקיבלו קשורות לוותק תרגול המדיטציה של הנבדקים
7. נוכח ממצאי הרגרסיה שהחוקרים קיבלו (שורות 126 - 139), מהו ניבוי אפשרי?
- (1) אדם שאינו מתרגל מדיטציה, יראה יכולות הדמיה (imagery) נמוכות יותר מאשר נזיר המתרגל מדיטציית DY במשך עשרים שנה, גם ללא תרגול מדיטציה לפני ביצוע מטלת ההדמיה
  - (2) נזיר המתרגל מדיטציית OP במשך עשר שנים, יראה יכולות הדמיה (imagery) נמוכות מאלו של נזיר המתרגל מדיטציית OP במשך עשרים שנה, גם ללא תרגול מדיטציה לפני ביצוע מטלת ההדמיה
  - (3) נזיר המתרגל מדיטציה שלושים שנה, יראה יכולות הדמיה (imagery) דומות לאלו של נזיר המתרגל מדיטציה עשר שנים, גם לפני וגם אחרי מדיטציה של 20 דקות
  - (4) נזיר המתרגל מדיטציה שלושים שנה, יראה יכולות הדמיה (imagery) טובות יותר לאחר 60 דקות לעומת לאחר 20 דקות
8. בניית תוצאות מבחן ה- VMT החוקרים הוסיפו ניתוח ANOVA חד-גורמי (שורות 158 - 160), שלא מופיע בנייתו של מבחן ה- MRT. סביר שהם עשו זאת כי:
- (1) במבחן ה- VMT, בניגוד ל- MRT, הם מצאו שיפור מובהק גם אצל קבוצת ה- OP, ורצו לבחון איזו שיטת מדיטציה הביאה לשיפור רב יותר
  - (2) במבחן ה- VMT, בניגוד למבחן ה- MRT, היה צורך לבדוק את השפעת גורם הזמן (pretest vs. posttest)
  - (3) למבחן ה- VMT יש שני חלקים (בראשון הנבדק מתבקש לזכור תמונת מטרה אחת, ובשני - שבע תמונות מטרה), בעוד שלמבחן ה- MRT יש רק חלק אחד
  - (4) בגלל שתוצאות מבחן ה- MRT הראו אפקט קרוב למובהקות של שיפור יכולות הדמיה (imagery) בקרב קבוצת הביקורת של הנבדקים שלא עשו מדיטציה וכן עשו אימון קוגניטיבי (nonmeditators imagery control group)

9. צוות חוקרים נפאלי שיחזר את המחקר המתואר במאמר. לפניכם גרף התוצאות שהתקבל. אילו מהמסקנות הבאות לא ניתן להסיק מהגרף?



- (1) בניסוי הנפאלי נמצאה השפעה לטווח ארוך של תרגול מדיטציה
- (2) בניסוי הנפאלי נמצאה השפעה לטווח קצר של תרגול מדיטציה
- (3) בניסוי הנפאלי נמצאה תלות בין סוג המדיטציה למידת שיפור יכולת ההדמיה (imagery)
- (4) לאימון ההדמיה (imagery) אין השפעה על יכולות ההדמיה (imagery)

10. הנזיר הראשי של מנזר Shechen מתווכח כבר שנים רבות עם מדענים אמריקנים ומתעקש על כך שמדיטציה מביאה למצב תודעה גבוה, המאפשר יכולות הדמיה (imagery) מוגברות. עם פרסום המאמר הוא ניגש לעמיתו האמריקני והראה לו בשמחה את תוצאות המאמר. מה מהבאים סביר שענה לו המדען האמריקני?

- (1) שקיימת בעייתיות בתוקף החיצוני של המחקר, כיוון שהוא בוצע רק בשתי שיטות מדיטציה
- (2) שאמנם מדיטציה משפרת יכולות הדמיה (imagery), אך לא באופן קבוע ומתמשך, אלא רק לאחר אימון מדיטציה
- (3) שלא ניתן להסיק זאת מהמחקר, כי האפקט נמצא רק במדיטציית ה-DY, אשר נשענת על יכולות הדמיה (imagery) מולטי-מודאליות
- (4) שהמחקר אינו תקף, כי מתרגלי המדיטציה שנבחנו הם בעלי ותק תרגול של למעלה מעשר שנים

ענה על השאלות הבאות על סמך ידיעותיך בפסיכולוגיה:

11. זיכרון אקספליסיטי (explicit memory) \_\_\_\_\_; וזיכרון אימפליסיטי (implicit memory)

- (1) מכיל זיכרונות רגשיים; מתבטא במיוחד בשלבים הראשונים של למידת מיומנות מוטורית
- (2) מתבטא בין היתר במטלות הטרמה (priming); מכיל ידע כללי על העולם
- (3) כולל רכישת חוקים בעקבות חשיפה לגירויים המאורגנים לפי חוקים אלו; מכיל עובדות ואירועים אישיים
- (4) מכיל ידע מנוסח ונגיש למודע; מתבטא במיומנויות תפיסתיות ומוטוריות



12. מה מהבאים מהווה הסבר ל"אשליית הירח" (moon illusion), בה כאשר הירח נראה בקו האופק הוא נתפס כגדול יותר לעומת כשהוא גבוה בשמיים?

(1) כשהירח באופק נמצאים בינו לבין הצופה אובייקטים רבים, המהווים רמזי עומק ונותנים אשליה של מרחק גדול יותר

(2) כאשר הירח בשמיים הוא רחוק יותר מהצופה לעומת כאשר הוא באופק

(3) הירח באופק נראה גדול יותר כי הוא תופס שטח גדול יותר בשדה הראייה

(4) כשהאובייקט קרוב העיניים נעות כלפי פנים (convergence), וכשהוא רחוק העיניים נעות כלפי חוץ (divergence)

## Text 2. Does Group Efficacy Increase Group Identification? Resolving Their Paradoxical Relationship

Martijn van Zomeren, Colin Wayne Leach and Russell Spears

Barack Obama's *Yes we can* slogan is a prime example of the importance of instilling individuals with hope for social change. The slogan contains two elements that represent psychological requirements for an affirmative answer to the question of whether “we can” achieve social change. First, the “we” communicates that individuals must identify with a *group* who together share the goal of social change.

5 Second, the “can” communicates that the group requires the strength to be able to *achieve* the change it seeks.

The paradox is that although it is clear that group efficacy<sup>1</sup> and group identification are positively correlated (Kelly & Breinlinger, 1995, Mummendey et al., 1999 and Van Zomeren, Postmes, & Spears, 2008), it is doubtful whether this relationship is due to the often assumed causal effect of group identification on

10 group efficacy (for reviews, see Klandermans, 1997 and Walker & Smith, 2002). A so far unexamined resolution to this paradox is that group efficacy leads to increased group identification, rather than vice versa. We believe that group efficacy indeed leads to increased group identification because it increases the tendency to undertake collective action (e.g., Van Zomeren et al., 2004). It is through

15 collective action tendencies that individuals *enact* their group identity and thereby concretely affirm and strengthen it as evidenced in increased identification with the group (e.g., Drury & Reicher, 2005). We therefore tested whether group efficacy increases group identification in an experiment.

Group identification and group efficacy are both important predictors of collective action against collective disadvantage, which is commonly defined as any action individuals take as representatives of their group to improve the group's situation (Wright, Taylor, & Moghaddam, 1990). The key explanations

20 for this complicated sociopsychological phenomenon have focused on individuals' identification with the disadvantaged group, their group efficacy beliefs, and their perception and emotional experience of injustice. For instance, both relative deprivation theory and social identity theory focus on the degree to which individuals perceive their disadvantage as group-based (Kawakami & Dion, 1992 ; Simon et al., 1998) and as unjust (Runciman, 1966)

25 A recent meta-analysis revealed that each of the major explanations of collective action has distinct value (Van Zomeren et al., 2008). Specifically, indicators of identity, efficacy, and injustice were found to be near equal, medium-sized, predictors of collective action. Moreover, these explanations are not unrelated to one another. In fact, group identity and group efficacy were found to be positively correlated. However, none of this research can establish that group identification *causes* group efficacy. In fact,

30 the few experiments performed to date do not support the view that group identification causes greater group efficacy beliefs. For instance, Van Zomeren et al. (2008, study 2) found that a manipulation individuals'

group (vs. personal) identity salience had no effect on individuals' group efficacy beliefs. Similarly, the manipulation of common fate in the study of Simon et al. (1998) increased individuals' identification with

35 a social movement but did not increase their belief in the group's efficacy.

1 Efficacy - חוללות

We propose that a stronger belief in group efficacy indicates that individuals are more focused on achieving group goals through the *joint effort* of collective action (Bandura, 1995, Bandura, 1997 ; Mummendey et al., 1999). Indeed, the notion that other group members are able and willing to take collective action is an important basis of the belief in group efficacy (Van Zomeren et al., 2004). This  
40 is consistent with the more general evidence that group efficacy beliefs increase team effectiveness and performance (Prussia & Kinicki, 1996) and that individuals' belief that social change is generally possible increases their group identification (e.g., Doosje et al., 2002, Ellemers, 1993, Mummendey et al., 1999 ; Tajfel, 1978).

More specifically, group efficacy beliefs should increase group identification by increasing the tendency  
45 to engage in collective action itself. Collective action based in belief in group efficacy can increase individuals' sense that they share a group identity that is concretely enacted through collective action. In other words, collective action based in the belief in group efficacy is an important way in which individuals "put their identity into action" (Reicher, 1996, Tajfel, 1978 ; Tajfel & Turner, 1979). (Drury & Reicher, 2000) ; (Drury & Reicher, 2005) works, in particular, suggest that group efficacy and attendant  
50 collective action tendencies can redefine individuals' group identity in terms of the collective action for which group members are prepared. As such, a shared tendency for collective action can serve as a concrete means by which the group identity is affirmed and strengthened (Drury & Reicher, 2005 and Ellemers, 1993. Our key hypothesis is therefore that stronger group efficacy beliefs increase individuals' group identification because it increases their collective action tendencies.

55 Ninety-eight students participated in an experiment during a mass testing session at the University of Amsterdam. The experiment was disguised as a survey conducted by an independent research body, modeled after the procedure used by Van Zomeren et al. (2004).. This (bogus) survey was about the opinion of first-year psychology students at the University of Amsterdam toward a recent plan of the University Board. Participants were informed that the plan proposed the raising of the tuition fees that  
60 students pay annually. Then, participants read whether an expert on collective action had stated that collective action would be effective in stopping this plan or not that effective. Participants were randomly allocated to one of the two conditions.

All participants read the following: "As you might have heard, there are government plans for financial cuts affecting all universities in The Netherlands. If these plans are carried out, all universities will then  
65 have to solve the problem of wishing to maintain high levels of quality education while lacking sufficient funds to achieve this. Therefore the University of Amsterdam has proposed a plan to raise annual tuition fees for its students by 600 euros". Then, participants read the following: "To justify this plan, University Board member J. Verhagen recently said in an interview, 'Cuts are always a negative event, but what can we do about it? If our students want to maintain their high level of quality education, we think  
70 they should pay more.. Participants in the first condition read the following: "Professor Klandermans of the Free University of Amsterdam, who is a specialist on the topic of collective action, reacted to this plan by saying in an interview: 'Collective action *really affects* these kinds of decisions. My research shows that especially in times like these, collective action *can* stop the raising of tuition fees.'" In the second condition, participants read: "Professor Klandermans of the Free University of Amsterdam, who  
75 is a specialist on the topic of collective action, reacted in the same interview to this plan by saying:

'Collective action *does not really affect* these kinds of decisions. My research shows that especially in times like these, collective action *cannot really stop* the raising of tuition fees'

All measures, derived from (Van Zomeren et al., 2004; Van Zomeren, Spears & Leach, 2008), applied 7-point response scales (i.e., 1 = *not at all*, 7 = *very much*). We first checked a 4-item measure of group efficacy ( $\alpha = .86$ ). We also measured collective action tendencies with four items ( $\alpha = .93$ ) and group identification with four items ( $\alpha = .90$ ).

We ALSO performed a principal axis factor analysis with oblique rotation (Russell, 2002). Results showed three extracted factors with an eigenvalue > 1 that corresponded exactly to our three measures. All items loaded strongly on their intended factor (with factor loadings > [.73]), and the explained variance was 71.88%.

TABLE 2.

**Correlations between dependent variables.**

	2.	3.
<b>Across experimental condition</b>		
1. Group efficacy	.32	.45
2. Group identification		.61
3. Collective action tendencies		

	1.	2.	3.
<b>By experimental condition</b>			
1. Group efficacy		.39	.52
2. Group identification	.18		.72
3. Collective action tendencies	.32	.50	

The top panel represents the correlation table across the sample, whereas the bottom panel represents the correlation table by experimental condition (above the diagonal = the high efficacy condition, whereas below the diagonal = the moderate efficacy condition).

An analysis of variance (ANOVA) with group efficacy as the independent variable and the group efficacy measure as the dependent variable showed a significant main effect of the group efficacy manipulation,  $F(1,96) = 6.66, p = .01, \eta_{\text{partial}}^2 = .07$ . Group efficacy beliefs were higher in the high group efficacy condition than in the moderate group efficacy condition. Thus, our manipulation was successful.

To test the causal effect of the group efficacy manipulation on the measure of group identification, we performed an ANOVA. As hypothesized, there was a significant main effect of group efficacy,  $F(1,96) =$

95 4.89,  $p = .03$ ,  $\eta_{\text{partial}}^2 = .05$ . Group identification was higher in the high group efficacy condition than in the moderate group efficacy condition. Also as hypothesized, an ANOVA showed that the group efficacy manipulation increased collective action tendencies,  $F(1,96) = 11.63$ ,  $p < .01$ ,  $\eta_{\text{partial}}^2 = .11$ . There were higher collective action tendencies in the high group efficacy condition than in the moderate group efficacy condition.

100 We used multiple regression analysis to examine our hypothesized model, whereby the group efficacy manipulation increased individuals' group identification through increasing their collective action tendencies. Because these two variables were both measured and hence their causal relationship cannot be determined with certainty, we also compared this model with an alternative mediation model in which the assumed mediator and outcome variable were switched. Finding more empirical support  
105 for the hypothesized model than for the alternative model would provide more confidence in our model (i.e., we conducted this test because it is an empirical alternative).

Following Baron and Kenny (1986), we established that group efficacy increased both group identification ( $\beta = .22$ ,  $p = .03$ ) and collective action tendencies ( $\beta = .33$ ,  $p < .01$ ). When we included collective action tendencies as an additional predictor of group identification, it strongly predicted group identification ( $\beta$   
110  $= .60$ ,  $p < .01$ ), and the direct effect of the group efficacy manipulation was no longer significant ( $\beta = .02$ ,  $p > .80$ ).

We also examined an alternative model where the manipulation of group efficacy increased collective action tendencies via group identification. When we included group identification as a predictor of collective action tendencies, it strongly predicted collective action tendencies ( $\beta = .57$ ,  $p < .01$ ), yet the  
115 direct effect of the group efficacy manipulation remained significant ( $\beta = .21$ ,  $p = .01$ ).

One of the strengths of experimental research is to establish a causal relationship that was hitherto only assumed to flow in a specific direction. In this respect, the current study provides the first experimental evidence for the causal link between group efficacy and collective action. This is consistent with a key prediction from *the dual pathway model of coping with collective disadvantage* (Van Zomeren et al., 2004  
120 ; Van Zomeren, Spears & Leach, 2008). This model views collective disadvantage as a potential threat that individuals need to cope with and predicts that individuals can become motivated to undertake collective action through their group efficacy beliefs (in addition, through their group-based anger). The model applies insights from the coping literature (e.g., Lazarus, 1991 ; Lazarus, 2001) to the group level by suggesting that the appraisal that the group has *coping potential* leads to *problem-focused approach*  
125 *coping*, which refers to attempts to change the situation through collective action (Van Zomeren et al., 2010). Because previous studies examined group efficacy beliefs as a (correlational) mediator rather than as a (experimental) cause of collective action (Van Zomeren et al., 2004 ; Van Zomeren, Spears & Leach, 2008), the current study supports more directly the dual pathway model's prediction that greater group efficacy leads to increased collective action tendencies.

130 The dual pathway model further explains why stronger group identification does not necessarily lead to stronger group efficacy beliefs. The model conceptualizes group identification as an indicator of the *relevance* of group identity (Van Zomeren et al., 2008) and predicts that the more relevant a group identity is for collective disadvantage, the more likely it is that coping is required to deal with it (Van Zomeren et al., 2010). However, the *type* of coping that occurs depends, in the case of problem-focused

135 approach coping, on the appraisal of coping potential (Lazarus, 1991). For this reason, there is no  
*necessary* causal link between group identification and group efficacy.

Moreover, the current findings reveal stronger group identification as a hitherto unidentified consequence  
of problem-focused approach coping. Our results thus suggest that collective action tendencies are not  
simply an “end state”. When such tendencies are increased by greater group efficacy beliefs, group  
140 identification is also increased. Indeed, stronger group efficacy beliefs can serve to redefine individuals'  
group identity in terms of the action for which individuals are preparing (e.g., Drury & Reicher, 2000 ;  
Drury & Reicher, 2005). This highlights the importance of the enactment of a group identity in collective  
action contexts, and more specifically of a shared tendency for collective action to serve as a concrete  
(180) means by which the group identity is affirmed and strengthened (Drury & Reicher, 2000, Drury &  
145 Reicher, 2005, Ellemers, 1993, Leach et al., in press ; Reicher, 1996).

## Text 2. Does Group Efficacy Increase Group Identification? Resolving Their Paradoxical Relationship

Martijn van Zomeren, Colin Wayne Leach and Russell Spears

1. במונחי הסיסמה של אובמה, מהן השערות המחקר הנוכחי:
  - (1) We מוביל ל-Can
  - (2) Can מוביל ל-We
  - (3) בין We ל-Can יש קשר מתאמי בלבד
  - (4) בין We ל-Can לא מתקיים בהכרח קשר
  
2. על פי הפסקה הרביעית (שורות 25 - 35), סמן ✓ ליד כל אחת מהטענות שנמצאה להן תמיכה במחקרים קודמים, וסמן ✗ ליד כל אחת מהטענות שלא נמצאה להן תמיכה במחקרים קודמים:  
הערה: group efficacy = חוללות קבוצתית
  - הזדהות עם הקבוצה גורמת לאמונה בחוללות הקבוצה
  - אמונה בשותפות גורל מובילה לאמונה בחוללות הקבוצה
  - אמונה בחוללות הקבוצה מנבאת פעולה קולקטיבית
  - אמונה בחוסר הוגנות כלפי הקבוצה מנבאת פעולה קולקטיבית
  - אמונה בשותפות גורל מובילה להזדהות עם הקבוצה
  
3. ההיגד "אני חושב שיחד אנחנו יכולים לשנות את המצב" הופיע באחד השאלונים ששימשו בניסוי הנוכחי. איזה משתנה סביר ששאלון זה נועד לבדוק?
  - (1) המשתנה התלוי בניסוי
  - (2) המשתנה הבלתי-תלוי בניסוי
  - (3) המשתנה המתווך בניסוי
  - (4) המשתנה הממתן בניסוי
  
4. בשורות 82 - 85 מדווחים החוקרים על תוצאותיה של פרוצדורה סטטיסטית שערכו. מה סביר ביותר שניסו החוקרים לבדוק בפרוצדורה זו?
  - (1) תוקף המבנה
  - (2) התוקף החיצוני
  - (3) תוקף סטטיסטי
  - (4) בדיקת מניפולציה

5. במחקר היפותטי, שיערו החוקרים כי אמונה בחוללות הקבוצה תשפיע על הזדהות עם הקבוצה, אך סברו כי לא ניתן לדעת אם היא תגביר או תחליש אותה. ניתן לומר כי במחקר ההיפותטי:

- (1) ה- $\beta$  תקטן לעומת המחקר הנוכחי
- (2) ה- $\beta$  תגדל לעומת המחקר הנוכחי
- (3) עוצמת המניפולציה תקטן לעומת המחקר הנוכחי
- (4) עוצמת המניפולציה תגדל לעומת המחקר הנוכחי

6. במחקר בדקו החוקרים את המודל המשוער וכן מודל חלופי (המתואר בשורות 112 - 115). מה ניתן לומר על בדיקה זו?

- (1) שני המודלים הציעו את אותו המשתנה התלוי
- (2) שני המודלים הציעו את אותו המשתנה הבלתי-תלוי
- (3) שני המודלים הציעו את אותו המשתנה המתווך
- (4) המשתנה המתווך במודל הראשון שימש כמשתנה הבלתי-תלוי במודל השני

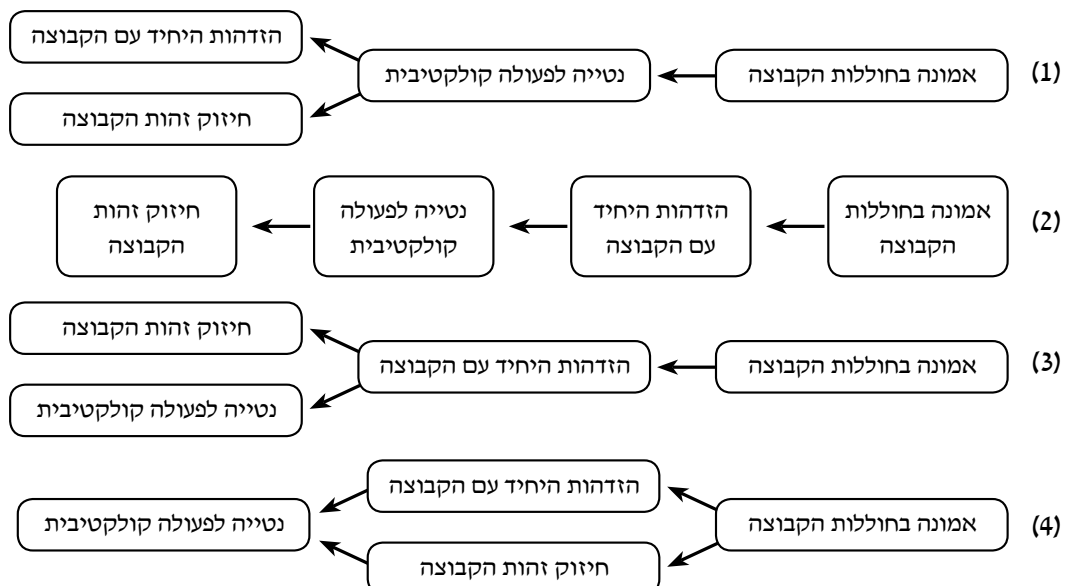
7. מדוע נקרא המודל "דו-נתיבי" (dual pathway) (שורה 119)?

- (1) כי לפי המודל, הן חוללות קבוצתיות והן הזדהות עם הקבוצה מובילים לפעולה קולקטיבית
- (2) כי לפי המודל, הן חוללות קבוצתיות והן כעס קבוצתי מובילים לפעולה קולקטיבית
- (3) כי לפי המודל נדרש משתנה מתווך - הזדהות עם הקבוצה - בקשר שבין חוללות קבוצתיות ופעולה קולקטיבית
- (4) כי לפי המודל נדרש משתנה מתווך - מידת הרלוונטיות של זהות הקבוצה לנחיתות הקבוצתית - בקשר שבין חוללות קבוצתיות והזדהות עם הקבוצה

8. המשתנה "פוטנציאל ההתמודדות" (coping potential), המוזכר בשורה 124:

- (1) שימש כמשתנה התלוי במחקר הנוכחי
- (2) שימש כמשתנה מתווך במחקר הנוכחי
- (3) לא נמדד במחקר הנוכחי
- (4) שימש כמשתנה בלתי-תלוי במחקר הנוכחי

9. על פי הפסקה האחרונה, איזה מן התרשימים הבאים מייצג את המסקנות הנגזרות מן הניסוי?





10. איזו מן הטבלאות הבאות מחזקת במידה הרבה ביותר את מסקנת החוקרים כי חוללות הקבוצה מובילה לנטייה לפעולה קולקטיבית, שבתורה מובילה להזדהות?

(2)

(1)

	2.	3.
Across experimental condition		
1. Group efficacy	.9	.7
2. Group identification		.2
3. Collective action tendencies		

	2.	3.
Across experimental condition		
1. Group efficacy	.2	.7
2. Group identification		.9
3. Collective action tendencies		

(4)

(3)

	2.	3.
Across experimental condition		
1. Group efficacy	.7	.2
2. Group identification		.9
3. Collective action tendencies		

	2.	3.
Across experimental condition		
1. Group efficacy	.9	.2
2. Group identification		.7
3. Collective action tendencies		

**ענה על השאלות הבאות על סמך ידיעותיך הכלליות בפסיכולוגיה:**

11. על פי הטקסט, הפרט יכול לחזק את תחושת הזהות שלו באמצעות פעולה קולקטיבית. דה-אינדיבידואציה היא מצב בו פרט בקבוצה חברתית חש שהוא מאבד את זהותו האישית ומתמזג עם זהות הקבוצה. איזה מן הבאים אינו מוביל לדה-אינדיבידואציה?

- (1) תחושת אנונימיות
- (2) שחרור מאחריות
- (3) השפעה מדכאת של הסביבה
- (4) עומס קוגניטיבי מוגבר

12. הטקסט דן בפעולה קבוצתית. התופעה של "בטלה חברתית" מתייחסת למידת המאמץ שישקיע היחיד, כאשר הוא פועל בקבוצה. איזה מן הבאים אינו נכון לגבי התופעה של "בטלה חברתית"?

- (1) ככל שקטן מספר חברי הקבוצה, הסיכוי להופעתה יורד
- (2) ככל שקושי המטלה גדל, הסיכוי להופעתה גדל
- (3) היא פוגמת בביצועי היחיד במיוחד במטלות קלות
- (4) היא נפוצה יותר בתרבויות אינדיבידואליסטיות מאשר בתרבויות קולקטיביסטיות

13. הטקסט עוסק בתופעה של חוללות קבוצתית. ההיגדים הבאים עוסקים בתופעה של חוללות עצמית. סמן ✓ ליד כל אחד מן ההיגדים הנכונים, וסמן ✗ ליד כל אחד מן ההיגדים שאינם נכונים.

- בעלי חוללות עצמית נמוכה מרבים לחשוב על אפשרות של כשלון
- בעלי חוללות עצמית נמוכה נוטים להעריך את המשימה כקשה מכפי שהיא באמת
- מידת החוללות העצמית משפיעה על עצם הבחירה או ההימנעות ממשימות מסוימות
- בעלי חוללות עצמית נמוכה עלולים לבצע משימות שהן מעבר לגבול היכולת שלהם
- בעלי חוללות עצמית נמוכה נוטים לשייך כשלון לגורמים סביבתיים
- בעלי חוללות עצמית גבוהה נוטים לשייך כשלון לגורמים פנימיים