

Title: Watch Your Language! Analyzing active ingredients of client speech in a Motivational Interviewing Intervention for Environmental Behavior Change

Deutscher Titel: Gesagt – getan? Eine Untersuchung sprachlicher Wirkfaktoren in einer umweltsychologischen Intervention zur Motivierenden Gesprächsführung

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Zusammenfassung

Motivierende Gesprächsführung (engl., Motivational Interviewing, MI) ist eine psychologische Interventionsmethode mit dem Ziel, eine/n Interviewte/n zu einer Verhaltensänderung zu bewegen. In einer MI-Intervention sollen veränderungsfördernde Aussagen — sogenannter Change Talk (z.B. „Ich will mich verändern“) — verstärkt werden, während veränderungshinderliche Aussagen — Counter Change Talk (z.B. „Ich werde mich nicht verändern“) — vermindert werden sollen. Bisher liegen keine MI-Wirksamkeitsstudien zu umweltfreundlichem Verhalten vor. Die vorliegende experimentelle Feldstudie untersucht den Einfluss eines MI auf Umweltverhalten mit Hilfe eines Input-Prozess-Output Modells. Aufgezeichnete Gespräche einer Gruppe von InterviewerInnen mit MI Training (n = 49) wurden mit einer Gruppe von untrainierten InterviewerInnen (n = 28) verglichen. Es wurden die Kommunikationsfertigkeiten der InterviewerInnen, die Sprache der Interviewten sowie deren Umweltverhalten kurz nach der Intervention und 3 Monate später erhoben. Trainierte InterviewerInnen zeigten bessere MI-Fertigkeiten im Vergleich zu untrainierten InterviewerInnen. Change Talk war höher ausgeprägt in der MI Gruppe, während sich keine Unterschiede im Counter Change Talk sowie im Umweltverhalten zwischen den Gruppen zeigte. Die Sprache der Interviewten (v.a. Selbstverpflichtungen) hing mit kurz- sowie langfristigem Umweltverhalten nach der Intervention zusammen. Unsere Ergebnisse weisen darauf hin, dass MI nachhaltig das Umweltverhalten verändern kann, wenn es InterviewerInnen gelingt, Counter Change Talk, d.h. vor allem negative Selbstverpflichtungen, zu reduzieren.

Schlüsselwörter: Motivierende Gesprächsführung, Veränderungsfördernde Sprache, Change Talk, Umweltverhalten

Abstract

Motivational Interviewing (MI) is a communication style that aims to motivate a conversational partner for behavior change by enhancing change talk (e.g., “I want to change”) and reducing counter change talk (“I will not change”). The effectiveness of MI has not been evaluated within the domain of environmental behavior change. This experimental field study examines the effects of Motivational Interviewing on environmental behavior within an input-process-output framework. Recorded conversations of MI trained participants (n = 49) were compared to conversations with untrained participants (n = 28). We compared communication skills, client language, and environmental behavior immediately after the intervention and at a three-month follow-up between groups. Trained interviewers showed higher proficiency in MI than untrained interviewers did. Change talk was higher in the MI group, whereas counter change talk showed no difference between intervention groups. Environmental behavior did not differ between groups. Client language — particularly commitment talk — was related with short- and long-term environmental behavior. Our results suggest that MI can foster long-term environmental behavior changes if interviewers succeed to decrease counter change talk, specifically negative commitments.

Keywords: motivational interviewing, change talk, counter change talk, conservation (ecological behavior)

In the face of changing climate conditions, psychology has developed a variety of interventions to improve pro-environmental behavior (Steg & Vlek, 2009). One interesting approach is to use existing psychological interventions that have a sound evidence base in one area (e.g., clinical psychology) and evaluate their effectiveness in the domain of environmental behavior change. The present study followed this approach and used Motivational Interviewing as an environmental behavior change intervention. First, we briefly give an overview of MI and its theoretical underpinnings. Second, we discuss the current MI literature in the context of environmental psychology. Third, we empirically test our hypotheses by means of an intervention study in which we compare conversations about pro-environmental behavior change between a MI intervention and control group. Fourth, we build on the current process model of MI effectiveness and investigate how active ingredients (i.e., process variables) of the intervention affect environmental outcomes.

1.1. What is MI?

MI is a person-centered method based on exchanging ideas with participants, aiming at helping them to voice reasons and commitments to change (Miller & Rollnick, 2013). MI was developed in clinical psychology to motivate participants for drug treatment and change consumption behavior. Within this context, numerous meta-analyses have provided evidence that MI is a viable intervention method for behavior change (e.g., Lundahl, Kunz, Brownell, Tollefson & Burke, 2010). In comparison to existing environmental behavior change interventions, MI overlaps with participatory interventions, that is, social interaction-based formats (Carrico & Riemer, 2011; Griesel, 2004; Matthies, 2000) and also commitment-building strategies (Lokhorst, Werner, Staats, van Dijk & Gale, 2013). What MI adds to these approaches is that it offers a variety of client-centered communication techniques for how to direct the micro-dynamics (in particular change language) of the verbal interaction. Currently, MI is either proposed or already used as an intervention method for environmental behavior change (e.g., Endrejat, Klonek & Kauffeld, 2015; Forsberg, Wickström & Källmén, 2014; Klonek & Kauffeld, 2015a, 2015b).

Klonek and Kauffeld (2015b) have argued that MI trainings could be used to train energy managers in organizations who are responsible to talk with consumers about energy-saving behavior at work. This theoretical argument is based on the idea that “how” energy-saving behavioral routines are communicated to employees will affect employees’ motivation to actually change their behavior. Concurrently, recent research suggests that energy managers lack core skills in MI (Endrejat et al., 2015). This is why environmental

inspectors in Sweden are trained in MI (Forsberg et al., 2014) and this training positively affects their communication skills. Unfortunately, Forsberg et al. (2014) did not assess whether the MI intervention also affected the motivational response of inspectees. Apart from the scarce research on MI as an environmental behavior change intervention, clinical scholars have discussed increasingly that in-session verbal behaviors are active ingredients for the effectiveness of a MI intervention (Magill et al., 2014).

The present study extends both research streams from environmental psychology and clinical psychology (1) comparing a MI environmental behavior change intervention with a control group, (2) measuring environmental behavior of participants immediately after and three months post-intervention using observational and self-reported measures, and (3) sampling within-session measures of participants' verbal behavior to pinpoint active ingredients of the intervention.

In sum, the current study offered a one-semester MI training for psychology students and evaluated how this affected pro-environmental conversations between peers. First, we assumed that MI-trained interviewers who have the task to motivate their peers to adopt pro-environmental behavior should demonstrate more person-centered communication. Second, conversational partners who talked to an MI-trained peer should also show more motivation to change. Finally, participants' verbally expressed motivation should be related to environmental behavior change after the intervention.

1.2. What functional process underlies behavior change in MI?

Theoretical explanations about the mechanism of change — also called active ingredients — in MI have emerged only recently. One line of arguments originates from clinical psychology research (Magill et al., 2014), while another line of theoretical arguments has focused more strongly on socio-psychological explanations (Leffingwell, Neumann, Babitzke, Leedy, & Walters, 2007; Vansteenkiste & Sheldon, 2006).

Researchers from clinical psychology are discussing a technical hypothesis of MI (Magill et al., 2014), that is, technical verbal skills in MI should elicit a “particular productive client behavior known as ‘change talk’” (Catley et al., 2006, p.44). An example of change talk could be “I should use less energy”. This hypothesis is called the a-path of the technical chain (Magill et al., 2014). Furthermore, client language should be related to behavior change (the b path of the chain). A MI meta-analysis supports the a- and b-path of the technical hypothesis (Magill et al., 2014): MI skills foster change talk ($r = .26, p < .01$) and inhibit counter change talk ($r = .10, p < .10$), e.g., “Switching the laptop off is uncomfortable”.

Social psychology theories that share common ground with MI are self-perception theory (SPT, Bem, 1972), cognitive dissonance theory (CDT, Festinger, 1957), and self-determination theory (SDT, detailed overviews that relate MI to SDT and to SPT/CDT are presented in Leffingwell et al., 2007, Vansteenkiste & Sheldon, 2006). Based on SPT (Bem, 1972), participants should alter their attitudes about environmental behavior because they hear themselves talking differently about the subject (i.e., an increased level of change talk), that is, they perceive that they talk about change and integrate this self-perception into their self-concept. Based on CDT, participants that offer change talk will “experience a shift in the balance of their ambivalence (...) and will make subsequent behavior changes based on this new self-perception, so as to minimize cognitive dissonance” (Houck, Moyers & Tesche, 2013, p. 495). Based on SDT, participants should alter their environmental behavior because MI conversations addresses participants’ needs for autonomy, relatedness, and competence: That is, participants can determine for themselves which environmental behavior they can change (autonomy), behavior change is addressed within a social interaction (relatedness), and interviewers support participants in showing sustainable behavior towards their environment (competence).

1.3. Hypotheses Section

1.3.1. MI Training Positively Affects Person-Centered Communication Skills

Prior studies have shown that relatively short MI trainings have a measurable impact on interviewers’ person-centered communication skills (Opheim, Andreasson, Eklund & Prescott, 2009; Tollison et al., 2008; Klonek & Kauffeld, 2015a) which is assessed by the relative amount of open questions or the rate of reflective listening. In a study of Opheim et al. (2009), medical students who received only 4 hours of training in MI asked significantly more open questions with role-playing clients than students who received no training. In sum, we expect the following:

H1: Interviewers who are trained in MI will show more client-centered communication skills (reflective listening, open questions, relative speaking time) than participants who have not been trained in MI.

1.3.2. MI Elicits Motivation to Change

The aim of MI is to increase a conversational partner’s intrinsic motivation for pro-environmental behavior. Client language can be considered as a natural measure of intrinsic motivation (Lombardi, Button & Westra, 2014; Magill, Apodaca, Barnett & Monti, 2010; Miller & Johnson, 2008) and clinical process studies have coded natural in-session

speech to assess clients' level of motivation (Miller, Moyers, Ernst & Amrhein, 2008). When talking about their environmental behavior, participants also provide reasons to change, for example, "I would save money if I switch off the lights" (change talk), or commitment to change (e.g., "I will switch off the lights consistently when I'm leaving a room"). In sum, differences in change talk between an MI and a control group give a more proximal indicator of the effectiveness of a conversation (cf., Miller & Mount, 2001). As the aim of MI is to enhance intrinsic motivation, we expect that participants who are trained in MI will be better skilled in evoking language favoring behavior change. This technical hypothesis proposes that MI skills positively affect change talk (Magill et al., 2014).

Hypothesis 2: Participants in an MI conversation show more change talk than participants who talk to an untrained interviewer.

While change talk is considered as an expression of motivation, counter change talk is conceptually the opposite and expresses participants' language in favor of maintaining their current behavior (Klonek & Kauffeld, 2015b; Miller et al., 2008). Both change and counter change talk are considered as two sides of a person's ambivalence (Miller & Rollnick, 2013). As MI encompasses methods to resolve this ambivalence, we expect that it will reduce counter change talk and consequently ambivalence.

Hypothesis 3: Participants in an MI conversation show less counter change talk than do participants who talk to an untrained interviewer.

1.3.3. *The Predictive Nature of Change Talk*

Previous MI studies also indicate that change talk itself is an active intervention ingredient that positively relates to post-intervention behavior (Aharonovich, Amrhein, Bisaga, Nunes & Hasin, 2008; Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003; Hodgins, Ching, McEwen, 2009; for a meta-analytic overview see Magill et al., 2014). In terms of social psychology, this b-path of the technical hypothesis could be also referred to as the *intention-behavior consistency*. The link between client language and intervention outcomes has been reported in clinical studies which targeted mostly pathological behaviors (Aharonovich et al., 2008; Amrhein et al., 2003; Hodgins et al., 2009). Most of these clinical studies have shown that commitment language is the best predictor for behavior change (Aharonovich et al., 2008; Amrhein et al., 2003; Hodgins et al., 2009). In line with this, scholars in environmental psychology have argued that a verbal commitment (also referred to as *pledge* or *behavioral contracting*) of participants in pro-environmental interventions accounts for long-term behavior change (Dwyer, Leeming,

Cobern, Porter, & Jackson, 1993; Lokhorst et al., 2013; Matthies, 2000). In a recent meta-analysis of environmental behavior change interventions, Lokhorst et al. (2013) showed that commitment-making is very effective to change environmental behavior and recommended that it should be combined with other interventions. This recommendation is recognized in MI in which the interviewers, in the first phase, seek to increase motivation to change and, in a second phase, evoke verbal commitments for behavior change. Even though researchers from clinical psychology have proposed that client language should be used as a predictor for behavior change for populations outside the realm of addictions (Lombardi et al., 2014), studies that assess how naturally occurring change talk is predictive of environmental behavior change are still missing. Therefore, we measured participants' change talk during the intervention and related it to post-intervention measures of environmental behavior.

Hypothesis 4: Change talk (specifically, positive commitment talk) is positively related to environmental behavior.

Hypothesis 5: Counter change talk (specifically, negative commitment talk) is negatively related to environmental behavior.

2. Method

2.1. Interviewers in the Intervention and Control Group

Two groups took the role of interviewers: One group of interviewers was trained in MI for about 40 hours within a period of three months (i.e., in intermittent blocks) as part of their psychology coursework. Apart from class training (21 hours), participants practiced MI inter-individually in peer groups on a biweekly basis, received homework, and studied MI literature (about 19 hours). The training was designed according to the eight stages of learning MI (Miller & Moyers, 2006). The control group received no MI training.

Interviewers in the MI group ($n = 15$) included thirteen undergraduate students of psychology, one Master's student in human resources development, and one Ph.D. psychology student. The gender ratio was well-balanced (7 males and 8 females). They were, on average, 29 years old ($SD = 8.32$) and studied in their fifth semester.

Interviewers in the control group ($n = 13$) received no training in MI. Interviewers in both groups received written information about the study procedure. They were told that they would have a conversation with another person about the topic of pro-environmental behavior. All interviewers received the task to motivate their conversational partner to increase pro-environmental behavior and to work out individual measures that participants should implement (see Appendix A for instructions of the control group). Control

interviewers were, on average, 31 years old ($SD = 13$) and studied in their sixth semester. The gender ratio was also well-balanced (6 males and 7 females).

2.2. Conversational Partners

Conversational partners (i.e., clients, $n = 77$) were, on average, 24 years old ($SD = 7.32$). Nearly all participants had either studied or were students (98.7 %, $N = 76$), that is, only one client had a secondary school level (1.3 %, $n = 1$). Furthermore, about a fifth indicated that they held some type of university degree (e.g., Diplom, Bachelor, Master, 19.5 %, $n = 15$); five participants also indicated that they had finished vocational training (6.5 %). Participants' characteristics such as age, gender, vocational training, education, and environmental concern did not differ between intervention and control group (all p 's > .05).

2.2.1. Recruitment Process

Clients were contacted verbally by email newsletters, or facebook (online) postings. They received lots (with monetary prices of 15-100 €) if they took part in the study, or received hourly credits for their degree program. Control group and MI interviewers knew beforehand that the topic of the conversation was environmental behavior change. Interviewers in the MI group took part in the study as part of their psychology coursework. The interviews took place as a part of a "transfer day" in which they could apply their newly acquired MI skills from training to a real conversational case.

2.3. Procedure

Clients were assigned based on their availability for an interview to an MI-trained ($n = 49$) or control ($n = 28$) interviewer. They were kept blind about the two different intervention conditions (MI or control group). Informed consent to videotape the interview was given by interviewers and clients. Three sessions (two in the intervention and one in the control group) could not be recorded due to technical problems, and were excluded from analyses. Interviewers in both groups were given a short written agenda that listed the topics which needed to be covered during the conversation; namely, setting the agenda, asking about current environmental behavior, giving feedback about environmental behavior to clients, asking for measures to increasing pro-environmental behavior, and planning measures and giving advice. As part of the giving advice part, all interviewers received a handout that listed pro-environmental behavior measures that they handed out and discussed with participants (e.g., to eat locally produced food).

After a period of three months (latency period for follow-up), conversational partners received an invitation for an online follow-up survey. This latency period is in accordance

with previous process studies of MI within the field of addiction (e.g., Baer et al., 2008) and is also within the range of follow-up latency periods used in studies focusing on pro-environmental behavior (e.g., Griesel, 2004). Fifty-eight participants (75.3 %) completed follow-up measurement. Drop-out did not statistically differ between intervention (drop-out = 25.5 %) and control group (drop-out = 22.2 %; $\chi^2 = .10, p = .75$). Figure 1 shows drop-out of participants in a flowchart. Four types of data were collected:

1. In-session verbal behavior of interviewers (i.e., communication skills) and clients (motivation to change) during the interview.
2. Observed environmentally harmful and beneficial behavior of participants after the interview.
3. Self-reported questionnaire measures of environmental behavior at follow-up.
4. Self-reported environmental actions at follow-up.

Insert Figure 1 about here

2.4. In-Session Measures

2.4.1. Interviewers' communication skills

We used a software-implemented version of the German Motivational Interviewing Treatment Integrity, MITI-d (Klonek, Quera & Kauffeld, 2015) to code communication skills of interviewers. The MITI-d differentiates between different verbal codes that are intended to capture communication skills in MI (e.g., closed and open questions, simple and complex reflections). Details about the instrument, psychometric properties and a coded transcript from the current study are given in Klonek, Quera and Kauffeld (2015).

2.4.2. Conversational partners' motivation to change and ambivalence

Conversational partners' (i.e., clients') motivation was assessed by means of coding their in-session verbal behavior (Klonek & Kauffeld, 2012, 2015b; Miller et al., 2008). Table 1 gives an overview of the codes. On the first level, client language speech is coded by its valence: Utterances with a positive inclination toward change are called change talk, whereas utterances that have a negative inclination toward change are called counter changer talk (some studies also use the synonymous term sustain talk). Utterances with no inclination toward change are termed follow neutral. On the second level, change and counter change talk utterances can be further differentiated into reasons, readiness (also known as "other"), taking steps, and commitment to change or to maintain the status quos, respectively (coded

transcripts are available in Klonek & Kauffeld, 2015b). Interviews (in minutes) had longer durations in the MI ($M = 42.71$; $SD = 18.16$) in comparison to the control group ($M = 30.51$, $SD = 15.15$; $t(72) = -2.94$, $p < .01$). In order to control for these time differences between interviews, we standardized the frequencies for each code to a 10-minute interval (i.e., “rates”, cf. Bakeman & Quera, 2011, p. 96; p. 101).

Insert Table 1 about here

2.4.3. Coder training and reliability

Two independent coders received training in classifying verbal behavior. Coding was performed with help of the software program INTERACT (Mangold, 2010; see Klonek et al., 2015). A sample of 14 (19 %) randomly selected sessions was used to assess interrater agreement using Cohen’s (1960) kappa. Kappa measures agreement between two coders and corrects for chance agreements. We calculated the time-based and event-based kappa coefficient as recommended by Bakeman, Quera, and Gnisci (2009) using GSEQ software (Bakeman & Quera, 2011): While a time-based kappa (κ_{TU}) overestimates the true agreement, event-based kappa (κ_E) underestimates true observer agreement. Hence, “their range likely captures the *true* value of K” (Bakeman et al., 2009, p. 146). Observer agreement for coding of the interviewers’ verbal behavior (MITI-d) achieved $\kappa_{TU} = .83$ and $\kappa_E = .67$; the coding system for client language reached $\kappa_{TU} = .75$ and $\kappa_E = .59$. According to Sachs (1999), values of $K \geq .61$ represent a strong agreement

2.5. Observed Environmental Behavior After the Interview

Conversational partners were brought into a waiting room with individual tables that were equipped equally with environmentally harmful and beneficial items. Moreover, clients had access to a separate bottle of water. In the waiting room, clients had access to environmental compatible alternative (regional fruits). A research assistant recorded if any items were consumed.

Environmentally harmful behavior. Each desk was equipped with cans of coke and non-local imported fruits with large CO² footprints (bananas and oranges). The desk was

always equipped with two items (to minimize courteousness effects). Consumption of either item (can, non-local fruits) was recorded as a measure of environmentally harmful behavior¹.

Environmentally beneficial behavior. Each desk was also equipped with flyers that informed participants about eco-friendly energy suppliers and a piggy bank in which participants could donate money for a pro-environmental project. Either taking a flyer or donating money was recorded as a measure for pro-environmental behavior.

2.6. Self-Reported Questionnaire Measures

All self-reported questionnaire measures originated from the third revised version of the scale system for assessing environmental concern (SEC, Schahn, 1999). Details about reliability and validity for the whole scale system are given in Schahn (1999; Schahn, Damian, Schurig & Fuchsle, 2000). Schahn (1999) reported that none of the SEC scales showed significant correlations with scales that assess social desirability.

2.6.1. Environmental concern

Environmental concern was measured for all participants prior to the intervention. We used a 21-item environmental concern scale from Schahn (1999; $M = 3.48$, $SD = 0.44$, $\alpha = .79$). This self-report measure has been shown to differentiate best between environmentally engaged individuals and a control population. Environmental concern is a construct that globally covers seven environmental domains (e.g., saving energy, sustainable mobility, sport and leisure activities, consumption, social engagement, recycling, water conservation) and three psychological dimensions (i.e., attitude, intentions, and behavior). Sample items are “One should not buy products that are energy-intensive or that need far transportation” (attitude; facet: energy saving); “I am ready to pay more for environmentally friendly products” (intentions; facet: consumption); “I abstain from using electrical devices (e.g., tin opener, juice squeezer, cutter etc.) even though this might cause more ‘hand-work’” (behavior; facet: energy saving).

2.6.2. Environmental behavior

¹ As part of the conversations, clients in both groups (MI and control) were informed that consumption of locally produced food constitutes a pro-environmental measure.

Environmental behavior at follow-up was assessed with two different measures (environmental behavior and implemented actions). We assessed environmental behavior with the 28-item behavior scale ($M = 3.22$, $SD = 0.30$, $\alpha = .64$) from the SEC scale system (cf., Schahn, 1999). Items were answered with a 5-point response format (1 = *strongly disagree* to 5 = *strongly agree*).

2.7. Self-Reported Environmental Actions

Participants could indicate the number of pro-environmental implanted actions carried out at the follow-up measurement. This measure was based on MI *action plans* (cf., Magill et al., 2010) and quantitative measures of *transfer quantity* from training evaluation studies (Grohmann & Kauffeld, 2013). In a previous study, transfer quantity has shown good moderate to strong correlations with satisfaction, utility, application to practice, or knowledge of an intervention ($r > .30$; Grohmann & Kauffeld, 2013).

Participants were presented with an online worksheet that stated the sentences: “I have carried out the following (first, second, third etc.) measure,” followed by an open space in which participants could type in their actions. The number of actions was summed up as the *number of implemented actions*. This follow-up measure was also significantly correlated with the overall number of pro-environmental flyers that participants collected after the interview ($r = .36$, $p < .01$).

2.8. Preliminary Data Analysis

Interviewers in both groups (MI and control) talked with 1 to 6 clients ($M = 3$, $SD = 1.27$; $Min = 1$, $Max = 6$), that is, one interviewer is nested within several clients. This nesting can result in dependence between interviewer and clients (Imel et al., 2014). Based on the small sample size of 28 interviewers in the current study, it is not possible to run multi-level analyzes without computing biased parameter estimates (Maas & Hox, 2005). However, we checked whether client outcome measures (observed environmental behavior post-interview, environmental behavior and actions at follow-up) differed between interviewers using analyses of variance and χ^2 -test and found no differences (all p 's $> .10$). As interviewers were not associated with outcomes, we did not control for counselor characteristics (cf., Baer et al., 2008).

Furthermore, we tested whether the experimental manipulation (MI versus control group intervention) of this study affected behavioral outcome measures. We computed chi-square using crosstabs for the dependent measures (observed environmental behavior immediately after the interview) and independent t-tests for 3-months follow-up behavior measures to compare the two levels of the independent variable (i.e., MI vs. control group).

There were no significant differences in those outcome measures between MI and the control group (all p 's > .05).

3. Results

3.1. Training Effects on Interviewers' Communication Skills

We calculated behavioral summary measures as benchmarks for person-centered communication in order to compare both groups. Measures included the relative amount of open questions to all questions (% open questions), rate of simple and complex reflections in a 10-minute interval, reflections-to-questions ratio (number of all reflections in comparison to the number of all questions), and relative speaking time of the interviewer. These summary scores are frequently used to assess client-centered skills in MI (e.g., Opheim et al., 2009; Tollison et al., 2008).

The percentage of open questions ($M = 52\%$, $SD = 17.59$ vs. $M = 25\%$, $SD = 10.33$, $t(71.9) = 8.36$, $p < .01$, $d = 2.02$), the rate of reflections ($M = 11.89$, $SD = 3.94$ vs. $M = 5.09$, $SD = 3.08$, $t(72) = 7.71$, $p < .01$, $d = 1.86$), and the reflections-to-question ratio ($M = 1.31$, $SD = 0.59$ vs. $M = 0.56$, $SD = 0.45$, $t(66.9) = 6.12$, $p < .01$, $d = 1.48$) all showed large effect sizes ($> .80$; Cohen, 1988) for MI-trained interviewers in comparison to interviewers from the control group. Control group interviewers who had received no training also talked more than their conversational partner ($M = 56\%$, $SD = 15.96$ vs. $M = 46\%$, $SD = 10.74$, $t(39.8) = 2.95$, $p < .01$, $d = 0.71$). Overall, these results support the first hypothesis that training in MI positively affected the person-centered communication within the interview.

We also compared the summary scores from the MI group to benchmark standards of good MI practice. Interviewers who received training reached at least beginner-level proficiency in MI for each benchmark by asking, on average, at least 50 % of open questions, reflecting statements of their conversational partner once per minute, and being at equilibrium with reflections and questions (1.31:1). These data show that interviewers in the MI group exhibited a good MI proficiency level.

3.2. Effect of MI on Conversational Partners' Motivation and Ambivalence

Table 2 compares client language for participants in the MI intervention and the control group. Change talk summarizes all positive client utterances, whereas counter change talk summarizes all negative client utterances (cf., Miller, 2000). Composite measures "can be interpreted as a single measure of motivational balance rather than two sides of the ambivalence" (Magill et al., 2014, p. 7). Therefore, we calculated two composite measures: Percent change talk constitutes the clients' overall *motivation* and is a summary measure that reflects the ratio between change talk (as numerator) and the sum of change talk and counter

change talk and follow neutral statements (as enumerator). As a second measure, we also calculated the ratio between change talk and counter change talk (i.e., change talk / counter change talk). It constitutes a measure for the clients' *ambivalence*: Values smaller than 1 indicate that counter change talk outweighs change talk (i.e., clients argue more against change), a value of 1 indicates that the client is ambivalent (i.e., change and counter change talk are equally strong), and values higher than 1 indicate that change talk outweighs counter change talk.

 Insert Table 2 about here

Conversational partners in the intervention group showed significantly higher levels of change talk ($M = 23.52$, $SD = 5.65$ vs. $M = 20.17$, $SD = 6.84$, $t(72) = 2.28$, $p < .05$, $d = 0.55$), reasons to change ($M = 6.91$, $SD = 2.88$ vs. $M = 4.12$, $SD = 1.88$, $t(72) = 4.34$, $p < .01$, $d = 1.05$), and readiness to change ($M = 10.45$, $SD = 3.43$ vs. $M = 7.94$, $SD = 2.84$, $t(72) = 3.22$, $p < .01$, $d = 0.78$) than clients in the control group. Both codes *taking steps to change* and *taking steps to sustain* were significantly lower in the intervention group compared to the control group ($M = 4.49$, $SD = 1.49$ vs. $M = 6.64$, $SD = 3.44$, $t(35.9) = -2.98$, $p < .01$, $d = -0.72$; and $M = 2.75$, $SD = 1.36$ vs. $M = 3.72$, $SD = 2.04$, $t(39.5) = -2.19$, $p < .05$, $d = -0.52$, respectively). Counter change talk showed no statistical differences between the intervention and the control group (all p 's $> .05$). Overall and in relation to all other client statements, conversational partners in the intervention group showed significantly higher overall motivation (i.e., % change talk, $M = 50.69\%$, $SD = 0.08$ vs. $M = 45.79\%$, $SD = 0.08$, $t(72) = 2.7$, $p < .01$, $d = 0.65$) in comparison to clients in the control group. At the same time, clients' ambivalence did not differ between clients in the MI and the control group.

These results mainly support the second hypothesis that the MI intervention itself positively affects clients' overall motivation in terms of change talk. Results do not support the third hypothesis that MI reduces counter change talk and consequently ambivalence towards changing.

3.3. Behavior Consistency Test

3.3.1. Change talk and observed post-interview behavior

Logistic regression analyses were used to test whether client language predicts the two dichotomous outcome variables of environmentally harmful or environmentally beneficial behavior that we observed after the interview. For the dependent variable of environmental harmful behavior, we coded 'yes' if we observed clients consuming a non-local imported fruit

or a can from the desk. For the dependent variable of environmental beneficial behavior, we coded 'yes' if we observed clients either spending money or taking one of the pro-environmental flyers from the desk.

Following the logistic regression analyses approach by Magill et al. (2010), we first used composite measures of client language, that is, *overall motivation* (i.e., change talk / all client statements) and *ambivalence* (i.e., change talk / counter change talk), as predictors in separate logistic regressions for primary analyses. Significant composite predictors (i.e., client ambivalence) were then disaggregated in a subsequent analysis in order to specify effects of specific client verbal codes on the dependent environmental behavior measure.

We first ran separate analyses for environmentally beneficial and harmful behavior (as dependent variables) while controlling for environmental concern. Due to small sample size and since the covariate (i.e., environmental concern) showed not significant effect on the dependent environmental outcome measures, we excluded it from subsequent analyses.

3.3.2. *Environmentally beneficial behavior post-interview*

Client motivation did not predict environmental behavior post-interview ($\chi^2 = 1.68, df = 1, p = .19$), whereas client ambivalence showed a significant effect on the dichotomous outcome variable (overall model: $\chi^2 = 4.48, df = 1, p < .05$). Logistic regression analyses provides odd ratio coefficients as a measure of effect size, with a value of 1 indicating no effect, values greater than 1 indicating the likely increase in the outcome with one unit increase in the predictor variable, and values smaller than 1 indicating the likely decrease in the outcome given one unit increase in the predictor variable. Client ambivalence showed an odd ratio of 4.71 ($B = 1.26, p < .05$), that is, clients with ambivalence of 2 (i.e., twice as much change talk as counter change talk) are 4.71 more likely to show pro-environmental behavior than clients with ambivalence of 1 (i.e., change talk is equal to counter change talk).

Table 3 shows the logistic regression model that uses disaggregated client language variables as predictors on environmentally beneficial behavior. The total model accounts for 51.3 % of variance in environmentally beneficial behavior ($\chi^2 = 28.12, df = 8, p < .01$) and shows that commitment to change positively predicts conversational partners' pro-environmental behavior after the interview ($B = 1.00, p < .01, OR = 2.72$), whereas negative reasons ($B = -0.42, p < .05, OR = 0.65$), negative readiness ($B = -0.41, p < .05, OR = 0.66$), and negative commitment ($B = -1.28, p < .07, OR = 0.28$) all negatively predicted environmental beneficial behavior. These results support both our hypotheses 4 and 5, that positive commitment talk is positively and counter change talk (including negative commitment talk) is negatively related to environmental behavior.

Insert Table 3 about here

3.3.3. *Environmentally harmful behavior post-interview*

Composite client language measures (neither overall motivation nor ambivalence) did not predict environmental harmful behavior post-interview (both overall models $p > .05$). We thusly did not run additional analyses using the disaggregated client language measures.

3.3.4. *Change talk and environmental behavior at follow-up behavior*

We calculated correlations between client language variables and environmental behavior measures at the three months follow-up. In order to exclude the possibility that results are due to different subsamples in our study, we present two separate correlation analyses: In the first analyses, we included the data available for the independent and dependent variables (i.e., client language and follow-up environmental measures, $n = 56$). In the second correlation analyses, we only included participants for which a complete data set on all dependent measures was available ($n = 41$). We also included the composite measures of client language (i.e., overall motivation and ambivalence) in the analyses to facilitate interpretation of results. Table 4 presents the results of these analyses.

Insert Table 4 about here

With respect to change talk, positive commitments were strongly correlated with the implemented actions at the three-month follow-up ($r = .46, p < .01$). With respect to negative client language, our results showed a significant negative correlation for counter change talk ($r = -.46, p < .01$), negative commitments ($r = -.35, p < .05$), and negative reasons with the self-reported measure of environmental behavior. For both composite measures of client language, the ambivalence index showed the strongest positive correlation ($r = .51, p < .01$ in both subsamples) with the self-reported measure of environmental behavior at follow-up, while clients' overall motivation only showed a marginally significant correlation with the self-reported behavior at follow-up (in the smaller data set).

Overall, these results support the hypotheses that client language and particularly commitment talk is related both positively (H4) and negatively (H5) to environmental behavior. Our results further substantiate the observation that counter change talk and composite measures (i.e., client ambivalence) predict environmental behavior (cf., Magill et al., 2014).

4. Discussion

4.1. Theoretical Implications

This is the first longitudinal study that tested the overall effectiveness and specific mechanisms of a MI intervention within conversations about pro-environmental behavior change. Our preliminary analyses showed no differences in environmental behavior measures between clients in the intervention and control group. Nonetheless, we showed that the MI training positively affected person-centered communication of interviewers. Second, participants in the MI condition also showed higher motivation to change while their ambivalence was not reduced in comparison to participants from the control group. Finally, our analysis provided evidence that participants' change language — in particular reduced ambivalence about changes, and commitment talk — is predictive of environmental behavior following the intervention. Following, we discuss research implications, future directions, and practical implications of this study.

4.1.1. Training effects: Interviewers showed increased person-centered communication

We coded the verbal behavior within the intervention and control group and showed that the training had strong effects on interviewers' communication skills. Most research on communication skills and listening behavior has relied on self-reported data while behavioral observations remain scarce (Bodie, 2013). We used an observational instrument to evaluate how MI training affected person-centered communication of interviewers. As expected, asking open questions and reflective listening were behaviors that were markedly increased after training. Nonetheless, we found no effect of the intervention on environmental behavior on conversational partners. This result suggests that the amount of MI training was not sufficient to also alter the environmental behavior of interaction partners. What follows is a detailed discussion how we explain why the MI intervention did not outperform the control group on the behavioral outcome variable.

4.1.2. Intervention test: MI positively affected change talk.

In addition to evaluating the effects of the MI training on interviewers, we also examined effects of the MI intervention itself on clients' in-session verbal behavior. Clients in the MI group in which interviewers used MI showed significantly increased levels of change talk compared to participants in the control condition. Significant differences in the overall summary measures of client motivation underpin the motivational effect of MI for the conversational partner; that is, MI was an effective intervention in terms of mobilizing conversational partners to talk about change. However, client ambivalence did not differ between MI and control group. It seems that the resolution of ambivalence is crucial not only

in therapeutic settings of MI but also to encourage pro-environmental change (Castro, Garrido, Reis & Menezes, 2009). Furthermore, our research design compared the MI intervention with another participatory intervention which is a strong comparison group (cf., Lundahl et al., 2010), that is, clients in both groups received a participatory interventions that are considered very effective in altering environmental behavior (e.g., Werner & Stanley, 2011). This finding is in line with a recent meta-analysis of MI clinical studies (Lundahl et al., 2010) that showed that MI does not outperform “treatment as usual”, that is, MI was equally effective in head-to-head comparisons and more effective in comparison with weak comparison groups (pamphlets or waiting groups).

4.1.3. Behavior consistency test: Client language as an active ingredient in socio-interaction based interventions

In the third part of this study, we examined which specific process variables are predictive of environmental behavior change. Counter change talk and the composite measure of client ambivalence showed significant associations with environmental behavior after the interview and three months later. We conclude that dealing with counter change talk and the resolution of ambivalence constitutes the most advanced skill in MI. These results of our environmental behavior intervention study point into the same direction as recent results from a meta-analysis about clinical MI process studies (Magill et al., 2014) that summarized the results of 12 process studies and reported that counter change talk was predictive of subsequent behavior change whereas change talk had no effect. Our analysis of participants’ language and environmental behavior provide support for one of the basic tenets of MI: Client language is related to subsequent behavior change. This is the first study that has tested this link for environmental behaviors. Furthermore, our composite measure of client ambivalence predicted environmental behavior in the short and long-term. This finding is also in line with research on ambivalence from environmental psychology (e.g., Castro et al., 2009).

4.1.4. The role of verbal commitments to change and commitments to maintain.

Participants’ verbal commitments to change also predicted subsequent environmental behavior post-interview and were also associated with implementing more environmental actions at follow-up. At the same time, participants that voiced negative commitments also did not engage in more environmental behavior three months after the intervention. Overall, these results support the assumption that fostering verbal commitments might be an active ingredient in behavior change interventions (Aharonovich et al., 2008; Amrhein et al., 2003; Hodgins et al., 2009; Dwyer et al., 1993; Lokhorst et al., 2013; Matthies, 2000).

Commitments are crucial in fostering long-term behavior change because others can witness the social promise (Lokhurst et al., 2013; Matthies, 2000). Our results also showed that participants' commitment to change did not differ between the MI and control group. This result could also explain why the MI group did not outperform the control group in terms of environmental behavior change and can be crucial for socio-interaction based interventions — it supports the assumption that public commitments (i.e. in the presence of others or while being videotaped) are important in fostering behavior change (e.g., Lokhurst et al., 2013; Matthies, 2000).

4.2. Contributions

Utilizing MI within the field of environmental psychology offers a new socio-interaction based intervention. Our study provides initial evidence that training in MI may contribute to the verbal skill acquisition of interviewers and replicates a recent field study (Forsberg et al., 2014). In addition to this, MI had positive effects on participants' verbal motivation in terms of change talk. Future research needs to evaluate how training designs can best qualify interviewers to handle counter change talk of their conversational partners. We also provided first evidence that client language is predictive for subsequent environmental actions. As language can be observed within a face-to-face context, it gives interviewers a proximal cue regarding whether their efforts to motivate others to adopt sustainable behavior will be successful. The Swedish Environmental Protection Agency already works with environmental protection inspectors who are in charge to “to promote sustainable environment for present and future generations” (Forsberg et al. 2014, p. 1). The results of our study are particularly important for this practical setting. We assume that environmental inspectors that are particularly trained in decoding counter change talk and ambivalence of their interaction partners are better skilled to motivate others towards pro-environmental behavior.

4.3. Limitations

The following methodological caveats need to be considered. The first caveat concerns the student sample in this pilot project. It is hard to estimate how results of this study may be transferred to applications in organizations or to other populations. Prior environmental studies have shown that participants with a higher educational background (as in our sample) also have more positive attitudes towards the environment (Grunenberg & Kuckartz, 2002). It is possible that the MI and control group did not differ with respect to environmental outcomes because participants in both groups already had quite positive pro-environmental

attitudes (i.e., possible ceiling effect). With respect to other settings, only one prior study has provided similar results and showed that MI training is also effective in professional conversations of Swedish environmental inspectors (Forsberg et al., 2014). Our study further contributes to this research by showing how an MI intervention also affected client language, environmental behavior, and by supporting the b-path of the technical hypothesis (Magill et al., 2014) with respect to environmental behavior.

Second, we tested the effects of the MI intervention only in a dyadic context as it provides a more controlled research context in comparison to workshop-based interventions. Future research should investigate how MI works within environmental group intervention programs. Prior research in environmental psychology suggests that guided-group discussions promote environmental actions by hearing others' pro-environmental language (Werner & Stanley, 2011). Future research should also investigate how MI trained group facilitators can promote motivational dynamics in pro-environmental group interventions like workshops (cf., Endrejat et al., 2015).

Third, the current study used a one-to-many design with one interviewer talking to several clients. As the current pilot study had a small sample size and varying interviewer-to-client ratios (i.e., some interviewers only talked to one client), we did not control interviewer characteristics. Previous research suggests that trained interviewers can vary largely in MI skillfulness and that this variable can affect the outcomes of a study (Gaume et al., 2014; Imel et al., 2014). This methodological caveat might also be a reason why the MI group did not outperform the control group interviews. Future studies should ensure to use a larger sample size of level two units (i.e., 30 - 50 interviewers) in order to test how characteristics of interviewers affect the outcome of an intervention (Imel et al., 2014).

Fourth, we assessed environmental behavior change only three months after the intervention. Previous clinical research suggests a sleeper effect of MI, that is, participants in the MI group showed more pronounced differences between control group participants if longer follow-up assessments (i.e., 15 months) were used (White, Mun, Pugh & Morgan, 2007). Overall, there is also need of more future field studies that assess the effect of MI on environmental behavior change using longer follow-up assessment periods.

4.4. Conclusions

Our study has shown how MI facilitates increases participants' change talk in an environmental behavior change intervention. We were able to identify key client language variables that need to be addressed by social change agents in interaction-based interventions.

If interviewers seek to address long-term effects on pro-environmental involvement, they need to reduce counter change talk language, particularly negative commitments, resolve client ambivalence, and increase client commitment talk.

5.1. Appendix A

Instructions used for interviewers in the control group as preparation before the interview.

Task	Convince your conversational partner to show more pro-environmental behavior.
Steps	<p>Before the interview:</p> <ol style="list-style-type: none"> 1. Review the questionnaire of your conversational partner and mark for yourself in which environmental areas your conversational partner shows little pro-environmental behavior. 2. Please note that all the answers that your conversational partner has checked and which contain an "i" in the code must first be reversed. I.e., the reply is in the opposite direction of the statement. <p>During the interview:</p> <ol style="list-style-type: none"> 1. Give feedback to your conversational partner concerning the areas in which he/she is not environmentally conscious. 2. Convince your conversational partner to improve his/her environmental awareness. You can use the "Interview guide" for help.
Time	<ol style="list-style-type: none"> 1. Reviewing your conversational partner's questionnaire (preparation): 10 minutes 2. Interview with conversational partner: 30-45 minutes
Resources	<ul style="list-style-type: none"> • Questionnaire of conversational partner's environmental behavior. • Interview Guide • Tips and advice on how to improve environmental behavior

5.2. Appendix B

Interview guide used for interviewers in the control group during the interview.

Interview Guide

1) Setting the agenda

“In this interview, we want to speak about your environmental behavior. This means what you do or can do to treat our planet in an ecologically sustainable way. Therefore, you have filled out a questionnaire that has given us a good impression and conveys what you should do differently...”

2) Asking about current environmental behavior

“What is your typical energy consumption spread across the week? What environmental resources do you use?”

3) Giving feedback over energy consumption / ecological footprint

The general rules of the questionnaire:

When a question was checked off at the highest level, there was really nothing to optimize. But when questions were checked off at a lower level... here, the client should plan specific measures to change something.

Questions that are marked with „i“ must be reversed. That is, if marked at the highest level, participants can change something about their environmental behavior.

You can use the sheet “Tips for improving environmental behavior” that lists how your conversational partner can help the environment.

4) Asking for measures to increasing pro-environmental behavior

5) Setting up an intervention plan / Give tips and advice on how to improve environmental behavior.

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Table 1.

Sample Statements of Change and Counter Change Talk for Pro-Environmental Behavior (e.g., Energy-Saving)

	Change Talk (+)	Counter Change Talk (-)
Reasons	<i>“If I switch off my laptop I would actually not be tempted to think about my work.”</i>	<i>“Switching the laptop on and off is kind of uncomfortable.”</i>
Readiness	<i>“I know that I use too much energy resources” (problem recognition).</i>	<i>“Saving energy does not necessarily make me feel better.”</i>
Taking Steps	<i>“When I cook, I have paid attention to cover the pot so that it heats up faster.”</i>	<i>“Well, I used the water heater a lot.”</i>
Commitment	<i>“I will switch off the lights if I am not in a room.”</i>	<i>“I promise you, this is never going to change.”</i>

Note. The code “readiness” (cf., Amrhein et al., 2003) is also referred to as „other“ in MI process research (cf., Miller et al., 2008)

Table 2.

Comparisons of Client Language Between the MI and Control Group

Variables	MI group ^a		Control group ^b		t	Cohen's d
	M	SD	M	SD		
Change Talk (+) (rate per 10 min)	23.52	5.65	20.17	6.84	2.28*	0.55
Reasons (+)	6.91	2.88	4.12	1.88	4.34**	1.05
Readiness (+)	10.45	3.43	7.94	2.84	3.22**	0.78
Taking Steps (+)	4.49	1.96	6.64	3.44	-2.98**	-0.72
Commitment (+)	1.68	1.14	1.47	1.30	0.73	0.18
Counter Change Talk (-) (rate per 10 min)	15.52	4.58	14.62	6.51	0.69	0.17
Reasons (-)	7.97	2.60	6.92	3.39	1.48	0.36
Readiness (-)	4.18	2.31	3.26	2.41	1.62	0.39
Taking Steps (-)	2.75	1.36	3.72	2.04	-2.19*	-0.52
Commitment (-)	0.62	0.66	0.72	0.59	-0.63	-0.15
Overall motivation (% change talk on all client statements)	50.69 %	0.08	45.79 %	0.08	2.7**	0.65
Ambivalence index	1.60	0.45	1.52	0.53	0.66	0.16

Note. *M* = mean; *SD* = standard deviation; '+' indicates change talk; '-' indicates counter change talk; Composite measures: % Change Talk (overall motivation) = change talk / (change talk + counter change talk + follow neutral); Ambivalence index = change talk / counter change talk.

^a*n* = 47. ^b*n* = 27.

* *p* < .05. ** *p* < .01.

Table 3.

Logistic Regression Model Predicting Environmental Beneficial Behavior Post-Interview by Means of Client Language

Predictor	<i>B (SE)</i>	Wald	<i>p</i>	<i>Odd ratio</i>
Reasons (+)	0.08 (0.13)	0.32	.57	1.08
Readiness (+)	-0.01 (0.12)	0.01	.94	0.99
Taking Steps (+)	-0.21 (0.17)	1.56	.21	0.81
Commitment (+)	1.00 (0.36)**	7.68	.01	2.72
Reasons (-)	-0.42 (0.17)*	5.90	.02	0.65
Readiness (-)	-0.41 (0.19)*	4.54	.03	0.66
Taking Steps (-)	1.22 (0.44)**	7.73	.01	3.40
Commitment (-)	-1.28 (0.7) [†]	3.37	.07	0.28

Note. $n = 58$; Nagelkerke $R^2 = .51$; ‘+’ indicates change talk; ‘-’ indicates counter change talk.
[†] $p < .10$ * $p < .05$. ** $p < .01$.

Table 4.

Means, Standard Deviations, and Pearson's Correlations between Client Language and Environmental Behaviors at the Three Month Follow-Up

	M	SD	Impl.		Impl.	
	<i>N</i> = 74		SEC-B	actions	SEC-B	actions
	<i>N</i> = 74		<i>N</i> = 56		<i>N</i> = 41	
Change Talk(+)	22.3	6.27	.00	.00	-.15	-.06
Reasons(+) (Composite)	5.88	2.88	-.09	-.05	-.26	-.18
Readiness(+)	9.53	3.43	-.07	.03	-.22	-.03
Taking Steps(+)	5.27	2.78	.22	-.21	.30 [†]	-.21
Commitment(+)	1.61	1.19	-.08	.48**	-.16	.46**
Counter Change Talk(-)	15.19	5.33	-.37**	-.20	-.46**	-.20
Reasons(-) (Composite)	7.58	2.93	-.25 [†]	-.15	-.37*	-.23
Readiness(-)	3.84	2.37	-.23 [†]	-.10	-.30 [†]	-.10
Taking Steps(-)	3.10	1.69	-.25 [†]	-.25 [†]	-.20	-.13
Commitment(-)	0.66	0.63	-.35**	.04	-.35*	.08
Overall motivation	50.62 %	0.08	.37**	.19	.27 [†]	.04
Ambivalence index	1.64	0.47	.51**	.18	.51**	.10

Note. SEC-B = Environmental behavior (28-items); impl. = implemented.

Composite measures: overall motivation (% Change Talk) = change talk / (change talk + counter change talk + follow neutral); Ambivalence index = change talk / counter change talk.

[†] $p < .10$ * $p < .05$. ** $p < .01$.

Figure 1.

Flow-chart of participants.

