Bachelor's thesis

NTNU
Norwegian University of Science and Technology

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Measuring Non-verbal Communicative Channels and their Effects

Bachelor's thesis in Psychology
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Measuring Non-verbal Communicative Channels and their Effects

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Supervisor: Hojjat Daniali

Preface

First and foremost, I would like to thank my project supervisor Hojjat Daniali for all the contributions he made to this project. I have gained a significant amount of insight and broadened my understanding of academic research. I would like to point out that during this project, I, among 14 others, were given training on how to code non-verbal behaviors, and were responsible for coding the non-verbal behaviors of the experimenters for our primary aim. Kjell Solem Slupphaug was responsible for designing a considerable amount of our online survey, creating the questionnaire itself on nettskjema.no and designed and selected a significant amount of the questions and measures in the secondary aim, which included the questions regarding fear of pain, cream-efficacy, PANAS, and hypothetical pain. Kjell Solem Slupphaug was also responsible for writing the code that was utilized to randomize participants in the online study, and for collecting and transposing the data from the primary and secondary aim into SPSS-files that was accessible to all the groups. These files were checked by me, and the other coders and potential missing values were filled in.
Regarding the other content of the survey, Aslak Bakke was responsible for editing the videos, and Nora Trohaug was largely responsible for designing the hypothetical scenario utilized in the online survey. Our supervisor Hojjat contributed on the survey as well, by giving feedback and frequent comments that could improve the questionnaire. I received help from Hojjat in regard to what statistical analyses should be run for the primary and secondary aim in this project, and also received continuous feedback of outstanding quality throughout my project.

Measuring Non-verbal Communicative Channels and their Effects

Abstract

Background: There is a continued focus on studying non-verbal behaviors in clinical settings, and the amplitude of effects these might have. The primary aim of this study was to measure the validity and reliability of four different sets of NBs that were shown in videos, and as such, to see if the videos were different in the way they should be. The secondary aim of this study was to investigate the effects of positive micro-level NBs on cream efficacy.

Methods: The participants of this study were given training to code non-verbal behaviors, and subsequently rated 21 videos of NBs in total, since there were 7 different videos, and 3 actors, all performing the 7 different videos. For the secondary aim, recruited participants completed an online survey that contained excerpts from these videos, and with several measures that participants filled out.

Results: The results demonstrated that the 7 videos were different, revealing that the preconditioning videos were equally neutral, and the videos with only one positive channel were only correspondingly positive in only the channel that they were meant to. Results from the secondary aim regarding the effects of positive micro-level NBs on cream efficacy failed to present findings indicating any effects.

Conclusion: The NBs tested were dissimilar, and the isolation was satisfactory, which may have shown that NBs can be systematically manipulated. Due to a lack of findings for the secondary aim, it is advised that pain induction scenarios and different placebo interventions are investigated in the future.

Introduction

The present study tested the validity and reliability of different *non-verbal behaviors* (NBs). The study is part of a larger project in which the potential effects of positive micro-level NBs are tested on experimentally induced heat pain. Micro-level NBs are smiling, body gestures, eye contact, tone of voice etc., that in a collected form at the macro-level, will convey a psychological meaning such as friendliness, warmth, or dominance (Daniali & Flaten, 2019). In the larger project, the non-verbal behaviors of experimenters are tested in a pain experiment context, where different professional actors are videotaped playing an experimenter and showing channelized, meaning overexpressed, NBs while guiding participants through the experiment. This channelization entails that the actors have played four different NB scenarios with the same script, and as such, the verbal information is identical across all the scenarios and the potential differences between the groups can be attributed to the non-verbal behaviors. The verbal information includes guiding the participants through several steps and procedures in the experiment and explaining the use of a placebo cream by the name of *Emblaa*, which is presented as a pain-alleviating cream that the participants are going to apply after the experimentally induced heat pain.

Non-verbal behaviors are a part of our non-linguistic communicational channels, and as such the elements of an interaction besides the spoken word, which would include facial movement, body position, vocal cues, interpersonal distance, as well as characteristics of the environment (Blanch-Hartigan, Ruben, Hall, & Mast, 2018).

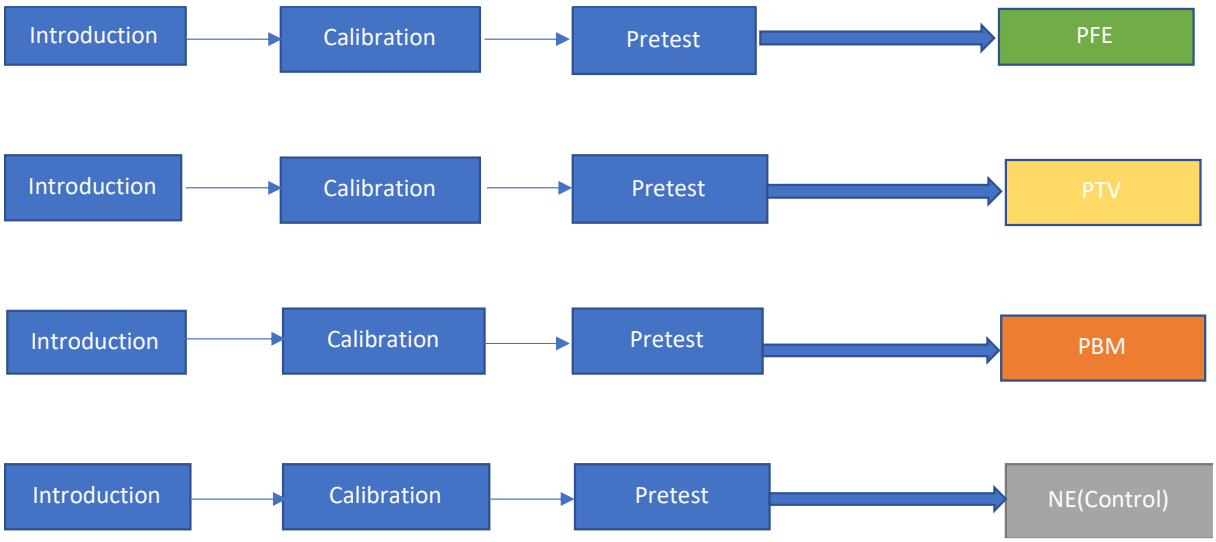
Previous research has alluded to the importance of NBs in medical settings, suggesting that positive NBs, such as smiling, increased eye contact, nodding and gesturing, may cause symptom relief in certain diseases (Kaptchuck, Kelley, Conboy, Davis, Kerr, Jacobson, et al., 2008), alleviate pain (Ruben, Blanch-Hartigan, & Hall, 2017), as well as reduce allergic responses (Howe, Goyer, & Crum, 2017). The four different sets of positive micro-level NBs that are to be tested in the larger project are facial expressions (FE), tone of voice (TV), body postures (BP), and a control group where the videotaped experimenters keep all their non-verbal behaviors neutral throughout the experiment by having a monotonous voice when guiding the participants, and by not moving their hands nor body, limiting their gaze at the camera, and by having a flat and plain face while sitting straight.

As such, when contextualizing NBs in a clinical setting, it has been proven that health providers´ NBs are capable of modulating treatment outcomes, with positive NBs lowering pain and other symptoms, as well as harnessing placebo effects (Ruben, Blanch-Hartigan, &

Hall, 2017), and negative NBs, such as no smiling, less or no eye contact, a monotonous tone of voice, etc., halting such placebo effects, enhancing pain, thus resulting in nocebo effects (Czerniak, Biegon, Ziv, Karnieli-Miller, Weiser, Alon, & Citron, 2016). The placebo effect is described as a psychobiological response that could occur following inactive or active interventions, and although several definitions are provided, the most prominent point mentioned is that there is no specific pharmacological ingredient or specific physiological mechanism in an intervention that accounts for the treatment response, and as a result is due to a biopsychososial response (Savvas, Zelencich, & Gibson, 2014).

Figure 1.

Order of Videos Shown for Primary Aim of This Study.



Note. All three preconditioning videos were shown first, and then either of the conditions.

The primary aim of this project had two phases. In the first phase the preconditioning videos are shown, and in the second phase, either of the condition videos (see Figure 1).

The larger mother project has four main phases that are all guided by videotaped experimenters, and it is claimed that the NB expressed in these phases are systematically manipulated. As shown in Figure 1, it is claimed that the NBs in the first three pre-conditioning phases are acted neutrally, and in the conditioning phases, only on singular NB channel has been enhanced. This is done so that the effects of singular micro-level NBs can

be tested on pain and a form of treatment. A videotaped experimenter will guide the participants through the experiment. The experimenter is playing the part as a health care personnel in the videos and will guide participants through the different phases. The experiment had two main phases, but several facets, wherein the preconditioning phase included the introduction, calibration and pretest videos, and the conditioning phase, which included the positive facial expressions (PFE), positive body movement (PBM), positive tone of voice (PTV), and neutral (control group) videos. Conditioning is referring to when pain stimuli plus the manipulation are induced. It is claimed that all the preconditioning videos are acted neutrally and thus categorized as neutral, and in the videos for conditioning, only one micro-level NB channel has been enhanced, while the other channels have been kept neutral.

However, the amplitude of the effects of NBs are not known, as well as how they can be used to promote the desired outcome. In addition to this, it is currently not known what NB channel is the most effective relative to others and given the clinical significance of NBs in treatment outcomes, the NBs should be systematically studied, by singling out different types of NBs and investigating their effects, in order to classify them into replicable and inspectable categories. By singling out the effects of different NBs, it might be possible to then implement the relevant NBs systematically in clinical settings to control the treatment outcomes.

As such, the claims made in the mother project should be ascertained before the videos can be used in the experiment, and it is therefore of importance to establish the fact that the different NBs in question are actually dissimilar, and hence the primary aim of this study is to measure the validity and reliability of several NBs.

The secondary aim is to investigate whether micro-level NBs can affect the treatment efficiency, and more specifically how different micro-level NBs affect the treatment efficiency of the product. This will be done through an online platform where participants are asked to fill out an online survey. The survey will include excerpts from the videos that are used in the larger project, containing professional actors that play experimenters exhibiting different micro-level NBs. The videotaped experimenters explain what Emblaa is and how the treatment works, and lastly, they ask the participants to rate how effective they expect Emblaa to be. Before watching the videos, the participants will be asked to imagine a hypothetical scenario in which they burn themselves on a frying pain, without sustaining severe injuries, but still with a lot of pain, accompanied by redness, swollenness, and some blisters. They will be asked to imagine that they search the web for treatment for this burn and find Emblaa, with a video describing how the cream works. Questions and scales regarding the cream's

efficiency will be included in the online survey, as well as questions and scales regarding how the participants perceive the experimenters as positive or negative.

The results could be relevant, as it may aid in singling out the effects of different NBs in clinical settings, and as such make it possible to study their effects systematically.

Study 1

Methods

Coders

Regarding the primary aim, the study included coders (N = 15, 73.3% female) between the ages of 21 to 25 who were attending NTNU as students at the time, more specifically the department of Dragvoll, which concerns mostly the social sciences. The average age of the coder was 22,80 years (SD = 1.28). The most commonly reported education level was no completed degree, but 3 students reported a completion of a one-year study. The coders received training on how to code and measure NBs before the measurements began and coded 21 different videos with three different experimenters exhibiting different NBs.

Measures

Nonverbal behavior measures and procedure

To measure the validity of the acted NBs it was required to code the acted NBs first, and then measure the reliability and validity. A NB rating scale was made to rate the NBs exhibited in the videos. The aim of the scale was to test the observed NBs based on the general impression of coders on the amplitude of each NB, even though the micro-level NBs were at focus. The videos were coded for the degree of different NBs exhibited by the experimenters on a 9-point numeric rating scale from 1 = *not at all* to 9 = *extremely*. The scale has 8 items such as: gesturing, smiling, eye contact, overall expressiveness, etc. This type of scale has been used in previous research examining nonverbal expressions of pain (Ruben, Blanch-Hartigan, &

Hall, 2017) and (Ruben & Hall, 2016), but this particular scale was made by Dr. Mollie A. Ruben.

In terms of internal consistency and reliability, there seems to be great agreement among the 15 coders, with an alpha coefficient over .90 for all items except *dominance* ($\alpha = .83$)

Videotaped Experimenters

There were three females recruited to play the part of experimenters. It is mentioned in the larger project that the experimenters are typecast to partially fit a usual health personnel stereotype: a Caucasian individual, not looking very young, slim and above average height, wearing white lab coats and with light makeup applied, for credibility purposes. The experimenters all conveyed information about the experiment´s general procedures and informed about the experimental condition and the placebo cream Emblaa. The recruited actors were trained to perform three sets of specific NBs, namely facial expressions, body postures, tone of voice, and a set of neutral NBs, and after the training, the performance of the actors was recorded. It would be relevant to mention that videotaped experimenters have been used in a successful manner to convey verbal and non-verbal information to participants in previous studies (Ruben, Blanch-Hartigan, & Hall, 2017).

Videos

As mentioned in the introduction, the preconditioning phase included 3 videos, which were claimed to be acted out equally neutral, and the conditioning phase had 4 videos, and each actor was videotaped performing all 7 videos, resulting in 21 videos in total. The videos were between 2.5 – 3.5 minutes long and the conditioning videos included four sets of positive micro-level NBs that will be investigated in the larger project. As mentioned, these include facial expressions, body postures, tone of voice, and a neutral (control) group. In the videos where facial expressions are overexpressed, the videotaped experimenter smiles and nods frequently, and looks straight at the participants, with more positive eyebrow movements and affirmative blinking. In the videos regarding tone of voice, the experimenter speaks with a

warm, energetic, friendly, strong, and expressively loud tone of voice. For the body posture videos, the experimenter leans forward frequently with less distance to the participants, including expressive and elaborate hand movements, such as indexing, affirming, numerical listing with fingers, as well as showing and simulating sizes and timelines. The videotaped experimenter´s express each set of NBs separately, meaning that while one set of NBs are enhanced, the other NBs channels are kept as neutral as possible.

The control group is a fourth, neutral group wherein the videotaped experimenter keeps their NBs neutral throughout the experiment, with a monotonous voice, not looking at the camera as much when conveying information, having a standard distance with the camera while sitting straight, having a flat and plain face throughout the experiment, as well as not moving their hands or body.

Statistical analysis

All data analysis was conducted by using SPSS27 for Mac. A Crohnbachs´ Alpha reliability analysis was conducted to test the internal consistency of coders´ ratings for the dominance, gesture, smile, eye contact, PTV, positive_general, expressiveness, and attractiveness scales. A One-way ANOVA was conducted to test the differences in these 8 items between the different actors. A One-way ANOVA was also conducted to test the differences in these 8 items between the 7 different videos.

Data Screening

The results from the NB rating scale used for the experimenter ratings were transferred to SPSS, controlled by all coders, and missing data was filled out.
The results for each of the 8 different items were computed into 8 grouping variables that represented the mean value for all the coders´ rating of the experimenter for each item, so that the One-way ANOVA could be conducted.

Results

A reliability analysis was conducted and showed that in terms of internal consistency and reliability, there seems to be great agreement among the 15 coders, with an alpha coefficient over .90 for all items except *dominance* ($\alpha = .83$).

Gesture: A One-way ANOVA revealed a significant difference between at least two video types in relation to gesture, $F(6, 14) = 206.09$, $p < .001$). An LSD post hoc test was conducted and showed that the main effect was due to the videotype PBM containing significantly more gesture than all the preconditioning videos, $\Delta M = 5.18\text{-}5.51$ (Intro-Pretest), $p < .001$), and the positive conditions, $\Delta M = 5.31\text{-}5.49$ (NE-PTV), $p < .001$), (see Table 1).

Table 1

*Means and Standard Deviations for each video condition for Gesture (*N = *21)*

MeanGestureNorge	*n*	*M*	*SD*
Introduction	3	1.44	.17
Calibration	3	1.36	.08
Pretest	3	1.11	.04
PFE	3	1.29	.04
PBM	3	6.62	.60
PTV	3	1.13	.07
Neutral	3	1.31	.08

Note. The maximum rating is 9.

Smile: A One-way ANOVA showed that there was a significant difference between at least two video types in relation to smile, $F(6, 14) = 16.93$, $p < .001$) An LSD post hoc test was conducted and showed that the main effect was due to the video type PFE video containing significantly more smile than all the preconditioning videos, $\Delta M = 4.49\text{-}4.69$, $p < .001$ (introduction-pretest), and the positive conditioning videos, $\Delta M = 3.96\text{-}4.85$, $p < .001$ (PTV-NE), (see Table 2).

Table 2

*Means and Standard Deviations for each video condition for Smile (*N = *21)*

MeanSmileNorge	*n*	*M*	*SD*
Introduction	3	1.69	.47
Calibration	3	1.60	.44
Pretest	3	1.49	.39
PFE	3	6.18	1.12
PBM	3	1.93	.88
PTV	3	2.22	.91
Neutral	3	1.33	.47

Note. The maximum rating is 9.

Eye contact: A One-way ANOVA revealed a significant difference between at least two video types in relation to eye contact, $F(6, 14) = 21.60$, $p < .001$). An LSD post hoc test showed that the main effect was due to the video type PFE containing significantly more eye contact than all the preconditioning videos, $\Delta M = 4.53\text{-}5.42$ (Intro-Pretest), $p < .001$, and the positive conditions, $\Delta M = 3.53\text{-}5.11$ (PBM-NE), $p < .001$. (See Table 3).

Table 3

*Means and Standard Deviations for each video condition for Eye Contact (*N = *21)*

MeanEyecontactNorge	*n*	*M*	*SD*
Introduction	3	3.71	.84
Calibration	3	3.00	1.16
Pretest	3	2.82	.62
PFE	3	8.24	.23
PBM	3	4.71	.44
PTV	3	3.91	.73
Neutral	3	3.13	.48

Note. The maximum rating is 9.

PTV: A One-way ANOVA revealed a significant difference between at least two video types in relation to PTV, $F(6, 14) = 28.16$, $p < .001$. An LSD post hoc test was conducted and showed that the main effect was due to video type PTV containing significantly more PTV than the preconditioning videos, $\Delta M = 3.18\text{-}3.33$ (Pretest-Calib), $p < .001$, and the positive conditions, $\Delta M = 1.76\text{-}3.91$ (PFE-NE), $p < .001$, (see Table 4).

Table 4

*Means and Standard Deviations for each video condition for PTV (*N = *21)*

MeanPTVNorge	*n*	*M*	*SD*
Introduction	3	3.36	.49
Calibration	3	3.27	.41
Pretest	3	3.42	.56
PFE	3	4.84	.48
PBM	3	3.69	.44
PTV	3	6.60	.00
Neutral	3	2.69	.41

Note. The maximum rating is 9.

The LSD post hoc test also showed that the video type PFE contained significantly more PTV than the preconditioning videos, $\Delta M = 1.42\text{-}1.57$ (Pretest-Calib), $p < .001$, and two positive conditions, except from PTV, $\Delta M = 1.15\text{-}2.15$ (PBM-NE), $p < .001$.

Dominance: A One-way ANOVA revealed a significant difference between at least two video types in relation to dominance, $F(6, 14) = 6.48$, $p = .002$). An LSD post hoc test was conducted and showed that the PFE video was rated highest in dominance (n = 3, $M = 3.80$), and contained significantly more dominance than the pretest video ($M = 2.80$, $\Delta M = 1.00$, $p < .001$) the calibration video ($M = 2.82$, $\Delta M = 0.98$, $p = .001$), the neutral video ($M = 2.91$, $\Delta M = 0.89$, $p = .002$), the PTV video ($M = 3.02$, $\Delta M = 0.78$, $p = .006$), and the introduction video ($M = 3.07$, $\Delta M = 0.73$, $p = .008$), (see Table 5).

Table 5

*Means and Standard Deviations for each video condition for Dominance (*N = *21)*

MeanDomaninceNorge	*n*	*M*	*SD*
Introduction	3	3.07	.24
Calibration	3	2.82	.08
Pretest	3	2.80	.23
PFE	3	3.80	.24
PBM	3	3.76	.60
PTV	3	3.02	.08
Neutral	3	2.91	.21

Note. The maximum rating is 9.

The LSD post hoc test showed that there were also significant differences in dominance between the PBM video, which was rated high in dominance (n = 3, M = 3.76) and the pretest video (M = 2.80, ΔM = 0.96, p = .001), the calibration video (M = 2.82, ΔM = 0.94, p = .002), the neutral video (M = 2.91, ΔM = 0.85, p = .003), PTV video (M = 3.02, ΔM = 0.74, p = .008), and the introduction video (M = 3.07, ΔM = 0.69, p = 0.12).

Positive_general: A One-way ANOVA revealed a significant difference between at least two video types in relation to general positivity, $F(6, 14) = 14.22$, $p < .001$). An LSD post hoc test was conducted and showed that the main effect was due to the video type PFE containing more general positivity than all the preconditioning videos, ΔM = 2.49-2.82 (Intro-Pretest), $p < .001$), the neutral video (M= 2.13, ΔM = 3.18, $p < .001$), and the PBM video (M = 3.78, ΔM = 1.53, p = .004), (see Table 6).

Table 6

*Means and Standard Deviations for each video condition for Positive_general (*N = *21)*

MeanPositive _generalNorge	*n*	*M*	*SD*
Introduction	3	2.82	.67
Calibration	3	2.69	.54
Pretest	3	2.49	.50
PFE	3	5.31	.68
PBM	3	3.78	.64
PTV	3	4.49	.21
Neutral	3	2.13	.35

Note. The maximum rating is 9.

The LSD post hoc test showed that there was also a significant difference between the PTV video, which was rated high in general positivity (n = 3, M = 4.49), and the neutral video (M = 2.13, ΔM = 2.36, $p < .001$), the pretest video (M = 2.49, ΔM = 2.00, $p < .001$), the calibration video (M = 2.69, ΔM = 1.80, $p = .001$), and the introduction video (M = 2.82, ΔM = 1.67, $p = .002$).

The LSD post hoc test also showed that there was a significant difference between the PBM video, which was rated high in general positivity, (n = 3, M = 3.78) and the neutral video (M = 2.13, ΔM = 1.65, $p = .002$), and the PFE video (M = 5.31, ΔM = -1.53, $p = .004$).

Expressive: A One-way ANOVA revealed a significant difference between at least two video types in relation to expressive, $F(6, 14) = 28.34$, $p < .001$). An LSD post hoc test was conducted and showed that the main effect was due to the video type PBM containing significantly more expressiveness than all the preconditioning videos, ΔM = 2.49-2.96 (Intro-Calib), $p < .001$, the neutral video (M = 1.76, ΔM = 3.00, $p < .001$), and the PTV video (M = 3.58, ΔM = 1.18, $p = .002$), (see Table 7).

Table 7

*Means and Standard Deviations for each video condition for Expressive (*N = *21)*

MeanExpressiveNorge	*n*	*M*	*SD*
Introduction	3	2.27	.50
Calibration	3	1.80	.12
Pretest	3	2.13	.23
PFE	3	4.04	.23
PBM	3	4.76	.74
PTV	3	3.58	.31
Neutral	3	1.76	.23

Note. The maximum rating is 9.

The LSD post hoc test also showed that the PFE video, which was rated high in expressiveness, was significantly more expressive than all the preconditioning videos, ΔM = 1.77-2.24 (Intro-Calib), $p < .001$), and the neutral video ($M = 1.76$, $\Delta M = 2.28$, $p < .001$).

The LSD post hoc test showed that the PTV video, which was rated high in expressiveness, was significantly more expressive than all the preconditioning videos, ΔM = 1.31-1.78 (Intro-Calib), $p < .001$), and the neutral video ($M = 1.76$, $\Delta M = 1.82$, $p < .001$).

A One-way ANOVA showed that there were no significant differences in any items between the different actors, except for *attractiveness*, where there was a significant difference between the actors $F(2, 18) = 3367.40$, $p < .001$). An LSD post hoc test was conducted and showed that the significant difference between the actors was between actor 1, who was rated as the most attractive ($M = 5.78$), and actor 3 ($M = 3.50$, $\Delta M = 2.28$, $p < .001$), and actor 2 ($M = 4.87$, $\Delta M = 0.91$, $p < .001$). There was also a significant difference in attractiveness between actor 2 and actor 3 ($\Delta M = 1.37$, $p < .001$).

Discussion

In this study, numerous non-verbal communicative channels were investigated, and there were several significant findings. Firstly, results demonstrate that there was great agreement between the coders for the scales regarding the experimenter ratings, as evidenced by the reliability analysis done on every scale, consistent with previous studies that has utilized such rating scales (Ruben & Hall, 2016; Ruben, Blanch-Hartigan, & Hall, 2017; Savvas, Zelencich, and Gibson, 2014). Secondly, and most importantly, the results demonstrate that the 7 videos are different in the way they are claimed to be different. The findings revealed that all the preconditioning videos were equally neutral, as they were not different in any of the NB channels. Relatedly, the conditioning videos with only one positive channel were correspondingly positive in only the channel that they were meant to. The PFE video had significantly more facial expressions, smiles, and eye contact than any other positive conditioning videos, the control video, and the preconditioning videos, the PBM video had significantly higher amounts of positive body movements than the other positive conditioning videos, the control video, and the preconditioning videos, and likewise, the PTV video contained significantly higher amounts of positive tone of voice than other positive conditionings videos, the control video, and the preconditioning videos.
Thirdly, the results showed that there were no differences in observed NBs between the different actors, except attractiveness, as evidenced by the post hoc tests.

These results are in line with prior studies that have attempted to channelize certain micro-level NBs to show their effects on pain (Czerniak et al., 2016; Ruben, Blanch-Hartigan, & Hall, 2017) and the possibilities of symptom relief (Kaptchuck et al., 2008) or reduction of allergic responses (Howe, Goyer, & Crum, 2017), and shows that it is possible to systematically manipulate the NBs.

The results of this study also showcased several significant differences in some NBs between several videos, the most prominent being general positivity, dominance, and expressiveness, leading to several macro findings. In line with previous studies (Blanch-Hartigan et al., 2018) the coding format of such NBs are often impression ratings, which as previously mentioned are on a more abstract level. The results show that the significant differences in these macro-level behaviors are predominantly between the enhanced NBs and the other videos that include the claimed neutral behavior, which is consistent with previous research that has attempted to convey a psychological meaning, such as warmth or friendliness, done by channelizing several micro-level NBs in a collected form (Czerniak et al., 2016; Kaptchuck et al, 2008; Ruben, Blanch-Hartigan, & Hall, 2017).

Additionally, other macro-level findings illustrate that general positivity differs significantly between PBM, PFE, and PTV, that were all high in general positivity, and the other neutral videos, with the former three all being positive micro-level NBs, that in the collected form will convey a psychological meaning such as friendliness, warmth, or in this case, general positivity. Out of the three positive videos, the results showed that the PFE video was the most positive, and a possible basis for this may be that the face of a person is more dynamic than their body, in the sense that more nonverbal data can be collected and interpreted by others. A face can exhibit smiles, raised eyebrows, and eye contact, and the duration and increase of these may convey general positivity better than increased gesturing or vocal modulation, and thus, if someone perceives increased duration and frequency of eye contact, they might interpret those nonverbal behaviors as more positive than increased and more frequent gesturing.

The results demonstrated the same for expressiveness, with expressiveness differing significantly between PBM, PFE, and PTV videos, which were high in expressiveness, and the rest of the neutral videos. Out of the three videos, the PBM video was the most expressive. A possible reason for this result may be due to the positive NBs being overexpressed while the others are kept neutral, and as such, the enhanced NBs could give off the impression of heightened expressiveness. The PBM video being the most expressive might also indicate that leaning forward more and having increased gesturing with hands, indexing and simulating sizes and timelines is perceived as more expressive nonverbal behavior than vocal modulation or increased duration of smiles and eye contact.

An interesting, but not surprising result, demonstrated that PTV differed significantly between not only the PTV video, which was rated high in PTV, and the other videos, but also between the PFE video, which was rated high in PTV, and the other videos. One possible reason for this may be that it is more difficult to isolate positive facial expressions without the facial expressions being accompanied by a more positive tone of voice. However, having already established that the NBs differ from each other nonverbally, as evidenced by the post hoc tests, this overlap would not have any significance for the results of this study, seeing as the claimed isolation proved satisfactory.

The results also showed that dominance differed significantly between the PFE and the other videos, and between the PBM and the other videos, with the PFE and PBM videos being high in dominance. Enhanced body movements such as leaning forward, exhibiting elaborate hand movements, including numerical listings with fingers, and showing sizes could lead to a

perception of the experimenter as more serious and professional, which may pose a possible explanation that is in line with previous research (Ruben, Blanch-Hartigan, & Hall, 2017).

In terms of the difference in attractiveness between the actors, it could seem like a difficult item to rate on an NB rating scale, but a possible reason for this result may simply be due to the fact that the item is not measured in the same way one would measure more traditional non-verbal behavior, such as smiling, gesturing and tone of voice. As evidenced by previous research (Blanch-Hartigan et al., 2018), items such as attractiveness are difficult to code and would most likely be impression ratings, which are performed on a more abstract level than one set of micro-level non-verbal behavior, or even in the collected form at the macro-level.

It could also be relevant to mention that the aim of the NB rating scale was to test the observed NBs based on the general impression of coders on the amplitude of each NB, with the micro-level NBs at focus, and thus differences in attractiveness between the different actors would not be seen as relevant to the research question, nor are these findings surprising.

Study 2

Methods

Participants

This study included participants (N = 100, 67.5% female) between the ages of 15 to 52, with a mean age of 25,34 (SD = 8.22). Education level was from 1 to 5 (M = 3.70, SD = .96), where 1 was “grunnskole” and 5 was “Master/PhD”, who were in attendance of NTNU at the time, more specifically, the department of Dragvoll, which concerns mostly the social sciences. Recruitment began in 2022 and ended the same year.

The inclusion criteria included being in attendance of NTNU, specifically the department of Dragvoll and the ability to fill out online survey regarding the project. The exclusion criteria were inability to give informed consent and not being in attendance of NTNU in the Dragvoll department.

Measures

Subjective pain measures

BFI: participants completed a shortened version of the Big Five Personality Inventory (BFI-10) (Rammstedt & John, 2007) which measures personality on five dimensions, with 10 items. The dimensions are Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience. The items are rated on a 5-point agreement scale from 1 = *Disagree strongly*, 2 = *Disagree a little*, 3 = *Neither agree nor disagree*, 4 = *Agree a little*, or 5 = *Strongly agree*.

Fear of Pain: The participants also filled out a fear of pain survey which measured fear of pain in relation to different events with 9 items. The items are rated on a Likert scale from 1 = *Not at all*, 2 = *a little*, 3 = *a fair amount*, 4 = *Very much*, or 5 = *Extreme*.

Pain intensity: An 11-point numeric rating scale from 0 = *No pain* to 10 = *worst possible pain*, that participants filled out during the survey was used to rate their hypothetical pain before and after watching the videos.

Cream efficacy: An 11-point numeric rating scale from 0 = *No pain reduction* to 10 = *100% pain reduction* was used to ask participants to rate how effective they would expect the cream to be in terms of reducing their pain.

Positive and Negative Affect Schedule (PANAS): The participants were also asked to rate the experimenters positive and negative affect, using the Positive and Negative Affect Schedule (PANAS), which measures positive and negative emotions. It is a 5-point Likert scale from 1 = *Very slightly or not at all* to 5 = *Extremely*.

Procedure

Participants from the departments of Dragvoll were recruited from advertisements in the form of fliers, in lectures, and by the “snowball” method by utilizing a QR-code and a survey link (This was however limited to the department). There were 4 surveys in total, that had a consent form introduced to the participants before any other questions were presented. Participants were asked to rate level of hypothetical pain and experimenter affect, for which the stimuli presented consisted of four different videos, where professional actors (all female) were videotaped playing an experimenter exhibiting varying levels of nonverbal behaviors.

The surveys were almost identical in their format, except from the videos presented, hence, there were four different surveys, with 25 participants each. Due to the nature of the study, ethics approval was not necessary (other than the consent form presented to the participants).

Participants were told to imagine a scenario where they burn themselves on a frying pan, without having any serious injuries, but that the area has turned red and swollen, accompanied by a few blisters and a lot of pain. Going further in this hypothetical situation, they were asked to imagine that they search the internet for an over-the-counter pain-relieving treatment, and find Emblaa, an approved treatment for thermal burns as a result, accompanied by a description of the medication in video form. The pain intensity scale was used to measure their hypothetical pain without, and later with any form of pain-relieving medication and before and after seeing any of the four videos used of the experimenters explaining the cream Emblaa.

Statistical analysis

All data analysis was conducted using SPSS27 for Mac. A One-way ANOVA was conducted to test the difference in cream efficacy between the 4 different videos.

Data screening

There was a control question in the online survey that asked the participants to answer what side-effects of Emblaa was presented in the video. This was to check that the participants paid attention when answering and thus would solidify that they paid attention when completing the survey. As such, participants that answered anything else than “no known side-effects”, were excluded from the analysis.
Participants with unreasonably long response times (over 1 hour) were also excluded from the analysis to further control for attention when completing the survey.

Results

A One-way ANOVA showed that there were no significant differences in cream efficacy between the different videos ($F(3, 76) = .37$, $p = .778$). The dependent variable was the cream efficacy, and the independent variable/factor was the 4 videos.

Table 1

*Means and Standard Deviations for each factor for Creamefficacy (*N = *80)*

Creamefficacy	*n*	*M*	*SD*
Neutral	19	4.84	1.39
PFE	22	5.23	2.14
PBM	19	5.16	2.41
PTV	20	5.50	1.79

Note. The maximum rating is 9.

Discussion

This study examined the effects of several micro-level NBs on cream efficacy, using the videos from study 1. Results demonstrate that there were no differences in cream efficacy between the different videos, and the results were also not significant. This does not resonate with evidence from previous research on non-verbal communicative channels and placebo treatment (Czerniak et al., 2016; Howe, Goyer, & Crum, 2017; Kaptchuck et al., 2008), and the results seem to not be in line with the concept that non-verbal behavior can modulate treatment efficacy. Having already established in study 1 that the NBs were as nonverbally different as they were claimed to be, the results from study 2 were expected to demonstrate some degree of difference in cream efficacy between the different videos, and it is worth reiterating that published literature would support such a finding. However, it would be relevant to reiterate that the study had a relatively small sample size (N = 80), and being conducted online with hypothetically imagined pain, these might be probable reasons for the findings, as there might have been an effect that we could not capture.

General discussion and limitations

Both studies investigated non-verbal communicative channels, but the aim of study 1 was to ascertain the claims made in the larger mother project and consequently test if the NBs in question were as nonverbally dissimilar as they were claimed to be, so the validity and reliability of several NBs were measured. Study 2 aimed to investigate the effects of such micro-level NBs on cream efficacy, not unlike previous work on placebo intervention and nonverbal behaviors (Czerniak et al., 2016; Howe, Goyer, & Crum, 2017; Kaptchuck et al., 2008).

Generally, the findings from study 1 were consistent with published literature that has attempted to channelize micro-level NBs to study their effects (Czerniak et al., 2016; Howe, Goyer, & Crum, 2017; Kaptchuck et al., 2008; Ruben, Blanch-Hartigan, & Hall, 2017) and showed that the claims made in the mother project regarding channelization of NBs could be ascertained, as well as claims that preconditioning videos were acted neutrally.
Regarding the results of study 1, one could argue that the positive micro-level NBs that were overexpressed in the PBM, PFE, and PTV videos may be acted out in conjunction by an actor to express a warm, friendly and supportive experimenter in other projects. Seeing as dominance differed between PBM and the other videos, and PFE and the other videos, it is possible to argue that by adding the third positive micro-level NB PTV, one could operationalize a caring experimenter.

Results also demonstrated that PTV differed significantly between the PFE video, which was rated higher in PTV, and the other videos, and a possible solution to this may be the reselection of a cue channel one could base their coding on. A plausible reason for this result may be that participants or coders that are watching a PFE video, pick up on vocal cues or frequencies, simply because they might expect someone with positive facial expression to also have a positive tone of voice, and as such, more consistent content filtering, or simply coding through an audio channel may be a possible solution.

The results from study 2 were expected to show some differences in cream efficacy between the different videos but demonstrated no differences. As previously mentioned, due to the nature of the study, there are several limitations. First, it is worth mentioning that the study had a small sample size (N = 80), and seeing as these videos are under 1 minute long, even though they have been controlled for a sufficient amount of NBs expressed, one could still argue that longer videos could lead to a lengthened association to the NBs and possible strengthened the effect on cream efficacy, which is in line with previous work (Savvas, Zelencich, & Gibson, 2014).

Second, one could argue that the placebo intervention may be too mild, especially when it is used in an imaginary scenario (Czerniak et al., 2016). Third, the nature of the study in general with hypothetical pain induced by an imagined scenario while completing an online survey is arguably too far-fetched from an actual clinical setting, and it is possible to assume that a different experimental design with actual pain inductions and real-life interactions may have different results (Ruben, Blanch-Hartigan, & Hall, 2017).

Study 1 adds to the existing literature by demonstrating the difference of NBs through acted channelization, and regarding study 2, future research should aim to address the limitations listed in order to possibly gain results coherent with previous literature.

Conclusion

The studies in this project regarding nonverbal communicative channels had different aims, and it was ascertained that the NBs that were claimed to be nonverbally different from each other, were dissimilar and the isolation of other nonverbal channels proved satisfactory. The second study failed to present any findings demonstrating the effect of NBs on the cream efficacy, and it is therefore advised that different placebo interventions and pain induction scenarios are investigated in the future.

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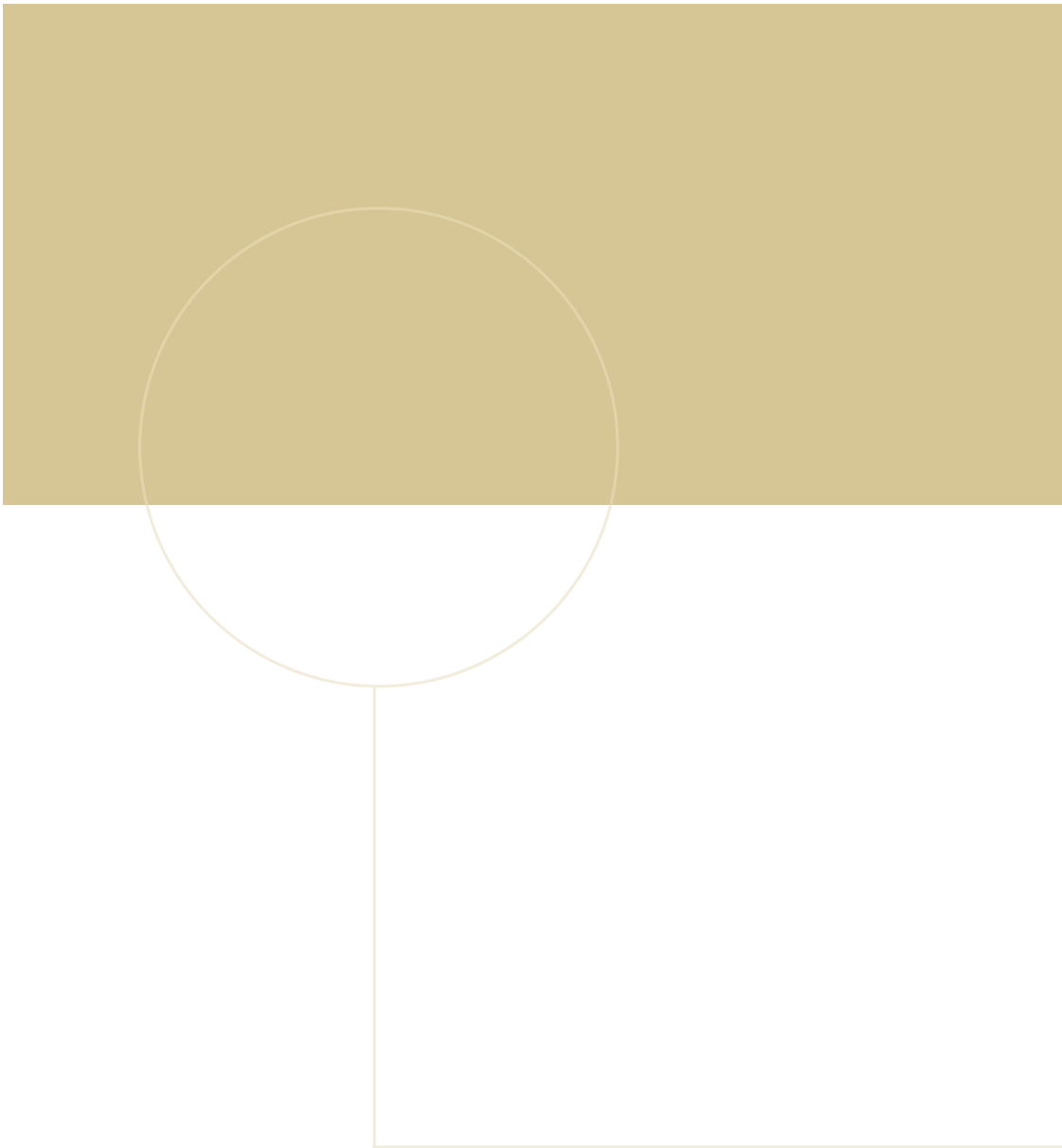

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