COMMUNICATING WITHOUT THE FACE: EXPRESSIVE BEHAVIOR AND SOCIAL PERCEPTION OF PEOPLE WITH FACIAL PARALYSIS

A dissertation

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ABSTRACT

Facial paralysis (FP) is an understudied condition which results in significant consequences for social interaction. Four studies examined the expressive behavior of people with FP, the way others interpret their behavior, and whether perceivers can be trained to improve their impressions. In Study 1, people with congenital FP were found to display more expressivity in their bodies and voices to compensate for their FP compared to people with acquired FP. This provides some of the first behavioral evidence that people with congenital disabilities use more adaptations than people with acquired conditions. In Studies 2 and 3, we examined perceivers' judgments of the emotions and personality traits of people with FP to test how perceivers integrate a paralyzed face with an expressive body and voice. We tested the extent to which emotion judgments are holistic, based on a combination of face, body, and voice, or based primarily on the paralyzed face. Perceivers observed short videotapes of people with FP and rated their impressions of targets' happiness (Study 2) and personality traits (Study 3). Perceivers were randomly assigned to observe isolated or combined communication channels. People with severe FP were rated as less happy and extraverted than people with mild FP, but use of compensatory expressive behavior improved perceivers' impressions. In Study 2, the difference in perceivers' happiness ratings for severe compared to mild FP was largest when perceivers only saw the face and reduced when additional channels were observed, suggesting that emotions are perceived holistically. However, for several traits in Study 3, perceivers' ratings for severe compared to mild FP did not differ whether they saw only the face or all channels, suggesting that trait judgments are judged holistically to a lesser extent. In Study 4, educating perceivers about FP and instructing them to attend to compensatory expressive channels improved their impressions of people with FP, but not their accuracy, suggesting that social perception is somewhat malleable. In conclusion, people with FP can compensate for their lack of facial expression, and people interacting with them can learn to look beyond the face to some extent.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Preface

The importance of facial expression in social interaction is well-documented. A large body of work now supports the existence of seven universal facial expressions of emotion (anger, contempt, disgust, fear, happiness, sadness, and surprise) that are produced and recognized across nearly all cultures (Ekman et al., 1969; Ekman & Friesen, 1986; Elfenbein & Ambady, 2002; Matsumoto & Willingham, 2009). This means that people with facial paralysis (FP) are unable to participate in one of the only universal languages. Facial expression also serves to initiate and regulate the dynamics of conversation, develop rapport, and build social connectedness (Ekman, 1986; Tickle-Degnen, 2006). There is a paucity of research on the consequences of impoverished facial expression on social interaction. In addition to the face, other channels, such as the body and voice, also serve to communicate social information.

This dissertation identified adaptive expressive behaviors (i.e. gestures, prosody) that people with different types of FP use to communicate and how other people form impressions about their emotions and personality. This research also tested a training intervention to improve perceivers' impressions of people with FP.

Types of Facial Paralysis

FP is a relatively common disorder with a variety of causes. Bleicher, Hamiel, Gengler, and Antimarino (1996) estimated the incidence of FP to be 50 cases per 100,000. Despite different causes and accompanying symptoms, all FP conditions result in the same social consequence—a reduced ability to communicate with the face. FP can be congenital or acquired (occurring at birth or sometime later in life) and unilateral or bilateral (paralyzing one or both sides of the face).

Congenital FP can result from prenatal maldevelopments (e.g. Moebius syndrome or Hemifacial Microsomia) or birth trauma (e.g. from forceps delivery). Estimates for the occurrence of congenital FP vary widely from 3,410 to 8,960 American births per year (Hughes, Harley, Milmoe, Bala, & Martorella, 1999). A notable example is Moebius syndrome, a condition resulting in FP, which is usually severe and bilateral, and impaired lateral movement of the eyes (Briegel, 2006; Möbius, 1888).

Acquired FP is estimated to occur in 118,000 Americans each year and can result from a variety of causes, including Bell's palsy, infections, damage to the facial nerve from neoplasms (e.g. acoustic neuroma, parotid tumors), and trauma (Bleicher et al., 1996). Bell's palsy is the most common cause of FP, resulting in FP that is usually unilateral (Bleicher et al., 1996). It results in FP that is usually unilateral and temporary, typically resolving completely within six weeks. Approximately 16% of Bell's palsy cases do not recover or recover incompletely (Peitersen, 1992), leaving a significant number of people with chronic residual FP.

Overview of Studies

Study 1 examined whether people with congenital FP used more compensatory expression (i.e. more expressivity in the body and voice) than people with acquired FP. In this study, adults with various types of congenital and

acquired FP were videotaped while recalling happy and sad events, and their verbal and nonverbal behavior was measured. Studies 2-4 examined the way social perceivers form impressions about people with FP. Participants without FP (perceivers) observed view short clips of the people with FP from Study 1 (targets), and rated their impressions of the targets' emotions (Study 2) and personality traits (Study 3). Study 4 tested a training intervention to improve the accuracy of perceivers' impressions of people with FP.

Study 1: Compensatory Expressive Behavior for Facial Paralysis: Adaptation to Congenital or Acquired Disability

People with FP are at risk for considerable social disability (Bogart & Matsumoto, 2010; Coulson, O'Dwyer, Adams, & Croxon, 2004). People with impoverished facial expression are perceived by others as unfriendly, depressed, disinterested, or unintelligent (Lyons, Tickle-Degnen, Henry, & Cohn, 2004b; Tickle-Degnen & Lyons, 2004), and others are less interested in pursuing friendships with them (Hemmesch, Tickle-Degnen, & Zebrowitz, 2009). In a sample of individuals with unilateral Bell's palsy, Coulson et al. (2004) found that impairment in forming just one of six basic expressions of emotion resulted in significantly poorer social functioning. However, in this study, we propose that people with FP may compensate for impoverished facial expression to some extent by becoming more expressive with their language, voice, and body. We suggest that people with congenital FP, who have lived with their conditions all of their lives, compared to people who acquire FP later in life, develop more adaptations to compensate for their impoverished facial expression by becoming more expressive with their bodies, voices, and language.

Adaptation to Disability

Adaptation to disability can be broadly defined as affective, cognitive, and behavioral changes that gradually approach an optimal state of person-environment congruence (Livneh & Antonak, 1997). Vash (1981) described the following 12 attributes of a disability that may influence an individual's response to his or her disability: time of onset, type of onset, functions impaired, severity, visibility, degree of disfigurement, degree of stigma, course, prognosis, and treatment. One of the least studied factors in the above list is time of onset, particularly whether the disability is congenital or acquired. Smart (2008) suggested that adaptation to disability is best when onset is congenital or early in childhood for the following reasons: 1. children are cognitively and affectively resilient and flexible; 2. there is no premorbid identity or functional loss; 3. children have not internalized society's prejudices about disability; and 4. children have not fully developed their body image.

There have only been a handful of studies that examined whether an earlier age of onset is associated with a better response to disability, and all of these studies used survey methodology (Alfano, Nielson, & Fink, 1993; Krause, 1992; Li & Moore, 1998; Woodrich & Patterson, 1983). For example, in a survey of 1,266 people with disabilities, Li and Moore (1998) found that people with congenital disabilities had higher levels of acceptance of disability compared to people with acquired disabilities. To our knowledge, no one has gone beyond survey research to examine adaptation behaviorally in people with congenital compared to acquired disability. In this study, we examine the behavioral adaptations of people with congenital compared to acquired FP in response to constraints on their facial expressiveness.

Psychosocial Effects of Facial Paralysis

No one to our knowledge has compared the psychosocial effects of congenital and acquired FP. Unfortunately, even in the broader literature on facial disfigurement, researchers have not distinguished between congenital and acquired conditions in their studies, although Newell (2000) suggested that people with congenital disfigurement may respond better to their condition and called for research in this area. Due to the difficulty of recruiting people with congenital FP, samples for FP studies are mostly comprised of people with acquired conditions. Several studies of people with various types of FP have found an increased incidence of anxiety and depression in people with these conditions (e.g. VanSwearingen, Cohn, Bajaj-Luthra, 1999; VanSwearingen, Cohn, Turnbull, Mrzai, & Johnson, 1998), and until recently, it was assumed that there was an equal risk for psychological distress across different types of conditions. For example, a study of 48 people with FP (only two participants had congenital FP), found that participants had high rates of anxiety and depression, with 65% of participants scoring in the clinical depression range of the Beck Depression Inventory (VanSwearingen et al. 1999).

However, in a condition-specific study of Moebius syndrome, Bogart and Matsumoto (2010) examined self-report measures of anxiety, depression, social functioning, and satisfaction with life in adults with Moebius syndrome, compared to age and gender matched control participants without FP and normative data. Of the factors examined, the only significant difference found between the Moebius participants compared to the control group or normative data was that the Moebius group reported lower social functioning. These findings suggest that people Moebius syndrome may be less likely to experience psychological distress compared to previous studies consisting mostly of acquired FP samples.

Compensatory Expressive Behavior

Although people with FP have difficulty communicating with facial expression, there are other expressive channels, the voice and body, which also communicate social information, including emotion and personality (Ambady, Bernieri, & Richeson, 2000). Although there has been considerable research on these channels among normal populations (for a review, see Noller, 1985), their use has not been studied in people with FP. In a qualitative study of adults with Moebius syndrome, participants reported compensating for their lack of facial expression by using expressive behaviors including body language, prosody, and verbal disclosure to express emotion (Bogart, Tickle-Degnen, & Joffe, 2012).

Purpose and Hypothesis

We aim to follow up the qualitative and survey-based research described above by quantitatively examining the actual adaptive behavior of people with FP, and by directly comparing people with congenital and acquired FP. Adaptation is operationally defined in this study as the use of compensatory expressive behaviors of the body and voice. We suggest that compensatory expressive behaviors may be among the most useful adaptations for people with FP to improve their social functioning because these behaviors aid in communication of social information such as emotion, interest, and friendliness (Ambady et al., 2000). We hypothesized that people with congenital FP would be more expressive in compensatory verbal and nonverbal channels than people with acquired FP.

Our hypothesis was that participants with congenital FP, compared to participants with acquired FP, would use more emotion words, vocal expressivity, and body expressivity when describing an emotional event.

Method

Overview

Participants with congenital and acquired FP were videotaped while they recalled sad and happy events in their lives in order to capture their emotionally expressive behavior. Trained coders viewed portions of the videos and rated the compensatory nonverbal behaviors and FP severity of each participant. Participants' compensatory verbal behavior was analyzed using the Linguistic Inquiry Word Count (LIWC; Pennebaker, Booth, & Francis, 2007), a software program that counts the usage of emotion words.

Participants

Recruiting flyers were posted at the Facial Nerve Center at Massachusetts Eye and Ear Hospital, and flyers and web postings were posted in the United States Moebius Syndrome Foundation newsletter and on their website. Although we attempted to recruit both acquired and congenital participants from the Facial Nerve Center, we were only able to recruit individuals with acquired FP from that site because few congenital patients attended the Center. Thus, the acquired participants were obtained through the Center, and the congenital participants were obtained through the Moebius Syndrome Foundation. Inclusion criteria were: 18 years or older, paralysis/paresis of at least part of the face, and ability to hold a comprehensible conversation in English. Of 30 participants who agreed to participate, three were excluded. One was excluded because the person had fully recovered from FP. One was excluded because the video was not properly recorded due to equipment failure. One was excluded because the participant did not complete the questionnaires. Thirteen participants had congenital FP and 14 had acquired FP. All congenital participants reported diagnoses of Moebius syndrome. For people with acquired FP, the reported diagnoses were as follows: benign facial tumors such as acoustic neuroma (n = 6), unremitted Bell's palsy (n = 4), infection (n = 2), facial nerve trauma (n = 1), brainstem tumor (n = 1). All participants were community-dwelling. Due to the rarity of the FP population, it was not feasible to balance FP severity or laterality between congenital and acquired paralysis; they varied naturally across groups. See Table 1 for additional participant information.

Procedure and Materials

Procedures. Prior to coming in for a videotaped interview, participants completed a questionnaire packet containing demographic questions, the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), and the Ten Item Personality Inventory (TIPI; Gosling et al., 2003), which is described below. All interviews were conducted by the same interviewer. The interviews lasted approximately 45 minutes, and included the following tasks, which are described in detail below: participants attempted standardized facial movements to be later assessed using the Sunnybrook Facial Grading Scale (FGS; Ross, Fradet, & Nedzelski, 1996), answered semi-structured questions about their experience living with FP (not reported in this study) and performed the autobiographical recall tasks. At the end of the study, participants were debriefed.

Measurement of depression. As described in the introduction, some studies have found high incidences of depression in FP (VanSwearingen et al., 1998; 1999). Since depression could have a dampening effect on verbal and nonverbal expressivity (Schwartz, Fair, Salt, Mandel, & Klerman, 1976), we administered HADS, a brief 14-item questionnaire measuring depression and anxiety (Zigmond & Snaith, 1983). In a literature review of 747 studies using HADS, Bjelland, Dahl, Haug, and Neckelmann (2002) concluded that it is a reliable and valid measure for assessing depression and anxiety disorders in medical patients and the general population. HADS is unlikely to confound with physical symptoms, and it has been used to measure depression and anxiety among people with FP (Bogart & Matsumoto, 2010).

Measurement of personality. The Ten-Item Personality Inventory (TIPI; Gosling et al., 2003), a very brief self-report measure of Big Five (McCrae & Costa, 1999) personality traits, was administered for the purposes of Studies 3 and 4. Convergent validity is supported by acceptable correlations with established Big Five personality trait measures in self-, other, and peer- reports (Gosling et al., 2003). The test-retest reliability is .72.

Autobiographical recall. Towards the end of the interview, participants were asked to perform autobiographical recall of a sad event, followed by a happy event (Ekman, Levenson, & Friesen, 1983). They were instructed to remember an event when they were feeling sad/happy, and to try to relive that event. Then they were instructed to describe the event while feeling that emotion. As a manipulation check, participants rated how happy and sad they were feeling on a scale from 1 to 5, with 5 being the most intense, at the beginning of the interview and after each recall.

Measurement of compensatory expressive verbal behavior. Participants' verbal responses to the sad and happy autobiographical recall were transcribed. The transcriptions were then analyzed using LIWC, a software program that quantitatively analyzes the extent to which certain words are used (Pennebaker et al., 2007). We were interested in the degree to which participants used positive (e.g. happy, joy, peaceful) and negative emotion words (e.g. sad, hate, hurt). LIWC utilizes a dictionary of almost 4,500 words that were categorized by expert judges. The positive and negative word subscales each have a Cronbach's α of .97 (Linguistic Inquiry and Word Count, n.d).

Measurement of compensatory expressive nonverbal behavior. A 20 s excerpt was taken from each of the 27 participants' videotapes at a standardized time point during the participant's autobiographical recall of a sad event and a happy event, resulting in a total of 54 clips. The standardized clip selection procedure was as follows: the clip included the last 30 seconds before the endpoint of the person's response minus the last ten seconds of the response. If this segment contained interviewer speech, videotapes were fast forwarded until a 20 s segment with the least amount of interviewer interruptions was found.

Eight items modified from the Interpersonal Communication Rating Protocol for Individual Expressive Behavior (ICRP-IEB; Tickle-Degnen, 2010) were used to rate the compensatory expressive behaviors of participants with FP. The items were: *inflection, laugh, talkativeness, loudness, gesture, head movement, trunk movement,* and *leg movement*. The items were chosen because they were conceptually related to compensatory expressive behaviors; they assessed behaviors that people could adapt, and they did not involve facial expression. Five trained raters viewed the clip excerpts and rated the quality, intensity, and frequency of each behavior on a scale of 1 to 5, with 5 being the most expressive. This method of sampling and rating short clips of social behavior is called thin slicing, and has been shown to be a highly reliable and valid representation of a person's interpersonal behavior (Ambady et al., 2000). Several studies of people with impoverished facial expression resulting from Parkinson's disease (PD) have used rating protocols similar to the ICRP to rate expressive behavior from thin slices (Lyons et al., 2004a; Tickle-Degnen & Lyons, 2004).

Raters were blind to the hypotheses as well as FP type and severity. While compensatory expressive nonverbal behavior was being rated, participants' faces were not visible. Raters observed and rated one channel at a time to avoid being influenced by other channels. When rating talkativeness and laughter in the voice channel, the video was not visible. When rating inflection and loudness in the voice channel, the video was not visible, and in order to prevent raters from being influenced by speech content, the audio track was content-filtered to remove speech content but retain the sound qualities of the voice (van Bezzoijen & Boves, 1986). When rating the body channel, the audio was turned off and the face was cropped out. The effective reliability, or the reliability of the average of the five raters as a group (Rosenthal & Rosnow, 2008), of each of the eight items ranged from .75 to 0.95.

We averaged ratings for each item across all five raters. A varimax rotated principal component analysis (PCA) constrained to two factors supported two internally consistent subscales of our modified ICRP: a voice scale consisting of the following items: inflection, laugh, talkativeness, loudness (Cronbach's α = 0.75), and a body scale consisting of the following items: gesture, head movement, trunk movement, and leg movement, (Cronbach's α = 0.78). We formed two compensatory expressivity composites based on the averages of the items in each of these scales.

Measurement of FP severity. Commonly used measures of FP severity such as FGS were not designed for use with bilateral FP (Ross et al., 1996). For instance, FGS instructs raters to compare the paralyzed side of the face to the normal side, but people with bilateral FP do not have a normal side. We preferred a measure that would be sensitive to *spontaneous* expressions that occur during social interaction, rather than a clinical measure like the FGS that assesses the ability to *voluntarily* form certain standard expressions. Thus, we measured FP severity using a method similar to our measurement of compensatory nonverbal expressivity with an ICRP item that instructed raters to rate the frequency, duration, and intensity of the overall expressivity of each side of the participant's face using a rating scale of 1 to 5, with 5 being the most expressive. The same five raters viewed video clips taken from the autobiographical recall of a happy event. We chose to rate the clips from the happy event because this is the context in which the face would be maximally expressive (Schwartz et al., 1976; Takahashi, Tickle-Degnen, Coster, & Latham, 2010). To prevent raters from being influenced by other expressive channels, the body was cropped from the video and the audio was turned off. Raters viewed and rated each side of participants' faces separately. The effective reliability for the five raters as a group was .87. Ratings were averaged across raters, and then each participant's left and right facial expressivity ratings were averaged to create a FP severity score for each participant.

In order to validate our measure of FP severity, we also assessed participants using FGS, a widely used measure in clinical practice to assess severity of FP (Ross et al., 1996). During the videotaped interview, participants attempted five standardized facial movements: eyebrow raise, gentle eye closure, open-lipped smile, snarl (nose wrinkling and upper lip raise), and lip pucker. An occupational therapy graduate student research assistant and the first author viewed these expressions and graded them using the FGS. As we discussed above, this measure was designed to assess people with unilateral FP, but many of our participants had bilateral FP. To account for this, raters scored each side of the face separately, and considered the degree of excursion independent of the participant's other side. The FGS scores of each participants' left and right sides were averaged to form a FGS total score. The interrater reliability of the FGS total score was ICC = 0.98. The FGS total score showed good convergent validity with the FP severity scores, $r = 0.79$.

Data Analysis Overview

In order to determine whether our autobiographical recall tasks were successful in eliciting emotion and whether the mood manipulation differentially affected participants with congenital or acquired FP or severe or mild FP, we conducted a 2 (onset: congenital or acquired) by 2 (FP severity dichotomized by median split: severe or mild) by 2 (emotion: happy or sad) by 3 (time: baseline, post-sad recall, post-happy recall) ANOVA with repeated measures on the last two factors on self-reported emotion ratings.

In order to test our hypothesis that participants with congenital FP use more compensatory expressive verbal behavior than those with acquired FP, we conducted a mixed 2 (onset) X 2 (dichotomized FP severity) X 2 (LIWC emotion word type: positive or negative) X 2 (emotion recall: happy or sad) ANOVA on LIWC emotion word percentages, with repeated measures on the last two factors. In order to test our hypotheses that participants with congenital FP use more compensatory expressive nonverbal behavior than participants with acquired FP, we conducted mixed 2 (onset) x 2 (dichotomized FP severity) x 2 (emotion recall: happy or sad) ANOVAs separately for the voice and body expressivity composites, with repeated measures on the last factor. We included FP severity in our ANOVAs as a blocking variable to control for the possibility that the confounding of onset with severity would account for differences in expressivity.

Preliminary analyses found two participants in the study had HADS scores of 11 or higher, the recommended cutoff for "definite depression" (Zigmond & Snaith, 1983). Indeed, these two participants self-reported having been diagnosed with depression. In order to ensure that the participants' depression was not affecting our results, we conducted our analyses with and without the data from these two individuals. With or without their data, the pattern of results and significance remained the same. We present the higher-powered findings from the full sample here.

Results

Autobiographical Recall Manipulation Check

Results showed that participants' moods changed during the autobiographical recall task in the expected direction. Figure 1 displays the means and standard errors representing participants' change in emotion during autobiographical recall. There was a significant interaction of emotion and time, $F(2,42) = 15.25$, $p < .001$, $\eta_p^2 = .42$, a main effect of emotion, $F(1,21) = 20.03$, $p < .001$, $\eta_p^2 = .49$, and a main effect of time, $F(2,42) = 4.57$, $p = .02$, $\eta_p^2 = .17$. Planned pairwise comparisons indicated that happiness marginally decreased from baseline to post-sad recall ($p = .14$, $\eta_p^2 = .05$), increased from post-sad recall to post-happy recall ($p < .001$, $\eta_p^2 = .24$), and from baseline to post-happy recall ($p < .0001$, $\eta_p^2 = .10$). Similarly, planned pairwise comparisons indicated that sadness increased from baseline to post-sad recall ($p < .001$, $\eta_p^2 = .34$), and from post-sad recall to post-happy recall ($p < .001$ $\eta_p^2 = .35$), but not from baseline to post-happy recall ($p = .60$, $\eta_p^2 = .00$). Thus, participants' emotions changed after the mood manipulations in the expected direction. There was a main effect of onset, indicating that people with congenital FP reported less extreme emotion overall ($M = 2.17$, $SE = 0.14$), compared to people with acquired FP ($M = 2.75$, $SE = 0.11$), $F(1,21) = 10.97$, $p < .001$, $\eta_p^2 = .35$). A significant main effect of FP severity indicated that people with severe FP reported more emotion ($M = 2.69$, $SE = 0.12$) than people with mild FP ($M = 2.24$, $SE = 0.13$), $F(1,21) = 6.48$, $p = .02$, $\eta_p^2 = .24$. There were no significant interactions of onset or severity with emotion and time, indicating that the mood manipulation did not differentially affect congenital and acquired participants.

Verbal Expressivity Analysis

In support of our hypothesis, there was a main effect of FP onset on LIWC emotion word percentages, indicating that people with congenital (*M* = 3.62, *SE* = .28), compared to acquired FP (*M* = 2.64, *SE* = .21), used more emotion words, $F(1,21) = 7.02$, $p = .02$, $\eta_p^2 = .25$. An interaction of emotion recall and emotion word type replicated the manipulation check, indicating that the emotional word usage of participants was congruent with the topic of the autobiographical recall, $F(1,21) = 33.70$, $p < .001$, $\eta_p^2 = .61$. Planned simple effects tests revealed that participants used more positive words when describing a happy event compared to a sad event, $F(1,21) = 14.52$, $p < .001$, $\eta_p^2 = .41$, and more negative words when describing a sad event compared to a happy event, $F(1,21) = 36.04$, $p < .001$, $\eta_p^2 = .64$. When recalling a happy event, participants used more positive than negative words $F(1,21) = 43.00$, $p < .001$, $\eta_p^2 = .67$, but when recalling a sad event, participants used an equal amount of positive and negative words, $F(1,21) = 1.80$, $p = .2$, $\eta_p^2 = .08$. There were no other significant effects.

Nonverbal Expressivity Analysis

For the voice expressivity composite, supporting our hypothesis, there was a significant main effect of onset, indicating that people with congenital FP (*M* = 2.94, *SE* = 0.13) use more vocal expression than people with acquired FP (*M* = 2.52, *SE* = 0.11), $F(1,23) = 6.08$, $p = .02$, $\eta_p^2 = .21$. There was also a significant main effect of facial expressivity, indicating that people with more facial expressivity (*M* = 2.92, *SE* = 0.13) were more expressive with their voices (*M* = 2.55, *SE* = 0.11), $F(1,23) = 4.91$, $p = .04$, $\eta_p^2 = .18$. There were no other significant effects.

For the body expressivity composite, there were no significant main effects, but there was a significant interaction of onset by emotion, $F(1,23) = 5.36$, $p = .03$, $\eta_p^2 = .18$. Figure 2 shows the *M* and *SE* of onset and emotion. Simple effects tests revealed that people with congenital FP used more body expression in the happy condition relative to the sad condition, $F(1,23) = 6.63$, $p = .02$, $\eta_p^2 = .22$, but people with acquired FP did not differ in the amount of expression used when discussing a happy or sad topic. In partial support of our hypothesis, there was a trend towards a simple effect revealing that when recalling a happy event, people with congenital FP tended to be more expressive than people with acquired FP, $F(1,23) = 3.40$, $p = .08$, $\eta_p^2 = .13$. There was no significant difference between people with congenital and acquired FP in their expressivity when recalling a sad event, $F(1,23) = 0.00$, $p = .98$, $\eta_p^2 = .00$.

Discussion

In this study, we recorded the actual interpersonal behavior of people with congenital and acquired FP on videotape and compared their use of compensatory expressive behavior. In support of our hypothesis, people with congenital FP used more emotion words, vocal expression (inflection, laughter, talkativeness, and vocal loudness), and tended to show increased body expression (gestures, head movements, trunk movements, and leg movements) but only when recalling a happy event. The expression of sadness may not involve bodily activity; the body may remain relatively still (Van den Stock, Righart, & DeGelder, 2007).

The increased compensatory expressive behavior in people with congenital FP could be attributed to several factors. People with congenital FP have had longer to adapt to FP. They went through early childhood development with their condition, a time when individuals are cognitively and affectively resilient (Smart, 2008). They did not experience functional losses, since they never relied on their faces to express themselves. It is possible that they have learned to adapt their behavior to communicate emotion, avoid misunderstandings and achieve positive outcomes like friendly interactions.

Some people with FP, particularly those with congenital FP, were aware of their compensatory behavior and considered it a compensatory strategy. During his interview, one man with Moebius syndrome said, "The tone, the volume, the rate, the timbre of the voice, and body language, I use to supplement in ways that my face can't provide…I have a whole repertoire of laughs that I use to respond to different situations." This is consistent with previous qualitative research on people with Moebius syndrome in which participants described using compensatory expressive behaviors (Bogart et al., 2012).

Methodological Considerations

Like all studies of FP, this study was limited by its recruiting method and small sample size (Briegel, 2006; Bleicher et al., 1996). The incidence of FP is too low to recruit from the general population. Thus, researchers must recruit from FP medical clinics and support groups. Our sampling was nonrandom, and participants who were willing to discuss their conditions on videotape selfselected into the study. Thus, both samples may have been skewed towards people who were better adjusted to their conditions. Additionally, the sample was not large enough to rule out that individual idiosyncratic behavior was captured and drove the results. Our acquired FP group consisted of a heterogeneous mix of conditions; in contrast, our congenital group was more homogenous, consisting only of people with Moebius syndrome. This reflects the fact that there are fewer known conditions resulting in congenital FP (Bleicher et al., 1996). The fact that our congenital and acquired samples were recruited from different sources is a limitation. However, despite potential differences discussed above, the two groups had similar backgrounds: all participants were community-dwelling, and most were college-educated and employed.

One concern is that the congenital group had more severe, bilateral FP than the acquired group. We accounted for FP severity in our ANOVA models, and severity did not affect expressive verbal or nonverbal behavior in all but one case: people with less severe FP were more vocally expressive. This finding is likely due to a confounding of FP severity with speech and vocal problems. We excluded participants who were not able to communicate clearly, and all of the participants' responses were readily comprehensible and transcribable. However, people with more severe FP may have had mouth and vocal cord weakness that subtly limited their ability to inflect their voices (Meyerson & Foushee, 1978). In all cases, the effect sizes for FP onset were larger than the effect sizes for FP severity on compensatory expressivity, indicating that FP onset is a more important factor in the development of compensatory behavior than severity of disability.

Some previous research has found high rates of depression in people with FP (VanSwearingen et al. 1998; 1999), and it could be argued that depression has the potential to dampen expressive behavior. Whether or not we included people categorized by HADS as definitely depressed in our analyses, our results remained the same. When Schwartz et al. (1976) used an emotional recall task similar to ours, they found that the expressive behavior of depressed patients was restored to a normal level. Thus, our autobiographical recall task may have prevented expressive dampening that might have otherwise occurred due to depression.

This study has several novel strengths. This was the first study to go beyond qualitative or survey methodology to measure the actual adaptive behavior of people with FP, and the first to sample relatively equal numbers of acquired and congenital FP. Indeed, it is one of the first to our knowledge to compare the adaptive behavior of people with any sort of congenital or acquired disability. Our study was strengthened by our use of multiple methods to measure expressive behavior. As such, this study is an important place to start this line of research. Due to the limitations described above, our results may not be generalizable; it is best to view them as descriptive of this sample, and to use them to inform future research.

Study 2: Social Perception of the Emotions of People with Facial Paralysis

Examining the way people form impressions about individuals with FP not only highlights the role of facial expression in social perception but, crucially, reveals the role of body and vocal expression as well. This study examined social perceivers' judgments of the emotions of people with FP to test how perceivers integrate a paralyzed face with an expressive body and voice.

An Ecological View of Social Perception

Social ecological theory asserts that people's features and behavior can convey meaningful information about their emotions and traits (Zebrowitz & Collins, 1997). Perceivers can attune to these cues to navigate their complex social environment efficiently. As a result of this process, in everyday life, people form first impressions about others' interpersonal attributes quickly and automatically (Chartrand & Bargh, 1999; Choi et al., 2005). Given just thin slices of behavioral information, such as in the form of short video or audio clips, people are able to make accurate judgments at levels far better than chance about a person's emotions, personality, competence, and many other social outcomes (Ambady & Rosenthal, 1992). People rely on a variety of contextual cues, expressive behaviors, and physical features when forming these impressions (Ambady et al., 2000). For example, a smiling person who nods his or her head and laughs frequently will be perceived as happy and extraverted, and people are likely to approach and interact with him or her. However, people are prone to overgeneralizing usually valid cues to situations in which the cues are not valid (Zebrowitz, 1997). Zebrowitz has shown that trait impressions are influenced by the resemblance of a targets' facial structure to an emotional expression. In the case of FP, a person with an inexpressive face may be perceived as unhappy and unfriendly, even though their facial appearance or lack of expression is not a valid indicator of their emotional state or personality.

Social Perception of People with Impoverished Facial Expression

Our lab has used a thin slice design to examine the expressive behaviors and social perception of people with PD (Hemmesch et al., 2009; Tickle-Degnen, & Lyons, 2004; Tickle-Degnen, Zebrowitz & Ma, 2010). People with PD commonly experience a set of symptoms called the *expressive mask*, which is a poverty of expression in the face, body and voice (Tickle-Degnen, & Lyons, 2004). The thin slice studies of PD conducted in our lab were based on videotaped interviews of people with PD, which were then coded by research assistants to measure the participants' expressive behavior, such as facial expressions, gestures, posture, and vocal tone. In these studies, perceivers viewed clips as short as 20 s from these videos and rated their impressions of the targets. We have consistently found that perceivers, whether they are healthcare practitioners, students, or older adults, are inaccurate and negatively biased in rating attributes such as likeability, depression, and Big Five personality traits (McCrae & Costa, 1999) in people with PD. Furthermore, their judgments are biased by facial masking (Hemmesch et al., 2009; Tickle-Degnen & Lyons 2004; Tickle-Degnen, Zebrowitz & Ma, 2010).

Other Channels of Communication

People with FP share some of the same social interaction problems as people with facial masking due to PD. However, in contrast to many people with PD, FP leaves the other expressive channels (body and voice) intact. Thus people with FP are able to compensate for their lack of expressions by using their bodies and voices. In the previous study, we found that people with congenital FP displayed more compensatory expressive behaviors than people with acquired FP. It is unclear how social perceivers might interpret the behavior of someone with FP who has an inexpressive face combined with other expressive channels. Many studies have examined the relative contribution of different channels to impression formation of emotions, and findings have varied widely (Noller, 1985). Two major accounts in the literature will be discussed: 1) the face is the dominant channel on which perceivers base their judgments; and 2) perceivers form their judgments holistically, based on a combination of the face, body, and voice.

Evidence for Face Dominance in Perception of Multiple Channels

Many studies have found that the face dominates emotional communication, and it results in equal or superior recognition accuracy compared to other channels or combinations of channels (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979; Wallbott & Scherer, 1986). Using the Profile of Nonverbal Sensitivity, Rosenthal et al. found that the channels of vocal tone, body, and face contribute to accuracy in a ratio of 1:2:4. Others have found a more nuanced pattern, with some channels more effectively conveying certain emotions or types of information (Friedman, 1979; Wallbott & Scherer, 1986). Friedman (1979) found that people rely more on the face when judging affect or friendliness, and rely more on speech when making more cognitive judgments or when information is discrepant. Wallbott and Scherer (1986) instructed professional actors to display happiness and sadness. They found that happiness was associated with more activity in all channels, while sadness was associated with less activity. Perceivers were asked to judge the actors' emotions when presented with face and body, speech, content-filtered voice, or all channels. Perceivers recognized happiness best when viewing the face and body, followed by all channels, then speech, and finally, voice. When rating sadness, perceivers were most accurate when viewing all channels, followed by face and body, then speech, then voice. This suggests that the face (and possibly the body, since the researchers did not separate them) may be the dominant channel for happiness recognition, but all channels are best for recognizing sadness.

Barkhuysen, Krahmer, and Swerts (2010) video and audiotaped participants while they read neutral or affective sentences and posed emotions. They found that positive emotions were detected equally well when perceivers viewed dynamic faces or when they observed a combination of dynamic faces and speech but were detected less well when perceivers listened to speech only. However, negative emotions were easier to detect when observing dynamic faces and speech, or when listening to speech only, compared to when viewing only the face. This suggests that perception of positive emotions is mostly reliant on the face, while perception of negative emotions is mostly reliant on the voice and speech. According to this literature, one prediction for this study would be that perceivers would base their emotion judgments primarily on the face when making judgments of happiness, which would result in people with severe FP being rated as having less positive emotions. When making judgments of sadness, perceivers would be more likely to base their judgments on all channels or speech, if those channels are available.

Evidence for Holistic Integration of Multiple Channels

FP may be conceptualized as incongruence between an expressive body and a neutral face or as a situation in which the signal quality of the face is weak. Several studies have involved controlled, artificially-created stimuli designed to have incongruent channels or reduced signal quality in the face (Aviezer et al. 2008; Collignon, et al., 2008; DeGelder & Vroomen, 2000; Focker, Gondan, & Roder, 2011; Meeren, van Heijnsbergen, & de Gelder, 2005; Van den Stock, Righart, & de Gelder, 2007). These suggest that people perceive social information holistically, based on a combination of the face, body, voice, and context, and this process occurs automatically, beyond conscious control or awareness. When perceivers are given stimuli that are a combination of facial and bodily expressions or facial and vocal expressions that are expressing a combination of congruent or incongruent emotions, and are instructed to report the emotion of just one channel, other channels automatically influence their judgments (Aviezer et al. 2008; Collignon, et al., 2008; DeGelder & Vroomen, 2000; Focker, Gondan, & Roder, 2011; Meeren, van Heijnsbergen, & de Gelder, 2005; Van den Stock, Righart, & de Gelder, 2007). In these studies, congruent channels facilitate speed and accuracy of emotion recognition, and incongruent channels interfere with emotion recognition. This suggests that social perceivers automatically incorporate information from other channels when forming impressions of emotion.

Collignon et al. (2008) paired dynamic posed facial expressions with non-linguistic vocal tones and manipulated the signal quality of the channels (by introducing white noise to the video, giving the effect of static) while participants completed a forced choice rating task between expressions of fear or disgust. When the signal quality of channels was good, participants were equally fast and accurate when rating the face or a combination of the face and voice, and showed poorer speed and accuracy when observing only the voice. This suggests that perceivers rely primarily on the face when making affective judgments of information with good signal quality. When the quality of the face channel was degraded, speed and accuracy were reduced when perceivers only observed the face. When the degraded face was combined with the voice, speed and accuracy rates returned to the levels of participants observing the voice only. This demonstrates that the dominance of the face in emotion perception is not rigid, but follows flexible rules dependent on signal quality. The holism research presented in this section suggests that perceivers may be influenced by other channels when observing people with FP.

It is difficult to integrate the findings on face dominance and holism due to methodological issues. The present study addresses several of these issues by examining the way others perceive individuals with FP. FP is a unique way to test the way communication channels are integrated by a perceiver, because people with FP are specifically impaired in communicating emotion with the face, but other channels (i.e. body and voice) are spared. Thus, we can examine the way perceivers judge emotion in the face, a channel that is usually a rich source of emotional information but that will provide very little information in the case of FP and examine whether additional channels of communication influence emotion judgments.

Emotion perception studies frequently have limited ecological validity due to the use of stimuli that are static, posed, or otherwise artificial. Emotional voice stimuli are often created by having an actor read a standardized (sometimes meaningless) sentence with various types of emotional prosody. Posed expressions may not reflect the way emotions are naturally expressed, but rather, the actors' stereotype of that expression. Further, when attempting to draw conclusions about the primacy of difference channels for emotion judgments, using posed expressions limits these findings because some channels may simply be more exaggerated, clear, or salient than others, simply as an artifact of the posing. Spontaneous expressions are more challenging to integrate because there is more "noise" (Matsumoto, Olide, Schug, Willingham, & Callan, 2009). Dynamic stimuli contain expressions that are constantly waxing, waning, and blending with other expressions and concurrent behaviors. The present study involves dynamic, naturalistic stimuli of spontaneous emotional expression collected from individuals from the community, not actors.

Many studies of holistic emotion perception instruct participants to focus on one channel in order to determine the influence of the other channel (DeGelder & Vroomen, 2000; Meeren, van Heijnsbergen, & de Gelder, 2005; Van den Stock et al., 2007). In the current study, perceivers were asked to judge how the whole person was feeling. This allowed participants to weight different channels naturally, and is a better test of whether certain channels are dominant. Further, this study involves an unusually complete parsing of different channels (most studies finding holism or face dominance did not include the body or separate vocal prosody from speech). This allowed us to compare each channel separately with the combination of all channels to determine which channels are the strongest contributors to emotion intensity perception. Unlike most emotion perception studies, the present study included neutral expressions (a paralysed face) and intensity ratings, which allowed us to examine whether emotion recognition of a combination of channels involves blending of intensities.

Purpose and Hypotheses

We examined social perceivers' judgments of the happiness of people with FP to test how perceivers integrate a paralyzed face with an expressive body and voice in their emotion judgments. We chose to focus on judgments of happiness because it is one of the most difficult expressions for people with FP to produce since it involves a great deal of muscular excursion (Ekman, 1986). People with FP report the inability to smile and express happiness as one of the most challenging symptoms of the condition (Bogart et al., 2012). Communicating happiness is particularly important to create positive first impressions, and build social relationships and rapport (Friedman, Riggio, & Casella, 1988; Riggio & Friedman, 1986; Shrout & Fiske, 1981; Tickle-Degnen, 2006). We tested two main hypotheses:

1) **Perceivers would show a severity bias.** Similar to the findings that perceivers overgeneralize a facially masked person with PD to have negative attributes, we predicted that perceivers would rate people with severe FP as less happy than people with mild FP because they overgeneralize a paralyzed face to indicate a lack of happiness.
2) **Perception of emotion in people with FP would be holistic.** Similar to studies finding that when the signal quality of the face is poor (Collignon et al., 2008) or expressions from multiple channels are incongruent (DeGelder & Vroomen, 2000), perceivers are influenced by other channels, we predicted that perceivers would integrate cues from multiple communication channels when rating the emotions of people with FP, rather than basing their impressions only on the face. We expected that perceivers would rate people with FP as less happy when observing only the face, compared to when observing other channels, because the face would be the least informative channel. Additionally, holism would result in a reduction of severity bias when perceivers observe all channels compared to the face only, indicating that perceivers incorporate information from channels other than the face when available. Further, we predicted that perceivers would rate targets who used more compensatory expressive behavior as happier than those who used less. This would indicate that perceivers incorporate compensatory expressive behaviors into their impressions, providing additional evidence for holism.

Method

Overview

A thin slice social perception study methodology was used (Ambady & Rosenthal, 2002). Stimuli were the thin slice clips from the videotapes of participants with FP in Study 1. Undergraduate perceivers were randomly assigned to observe isolated or combined communication channels and rated their impressions of the targets' happiness and sadness.

Target Stimuli

Stimuli were the 20 s. clips of 27 people with FP obtained in Study 1. There were 54 clips in total (2 clips per person: happy recall and sad recall). The expressivity ratings from coders in Study 1 were used to determine the FP severity and amount of compensatory expression of each target. We dichotomized targets into low or high compensatory expression and severe or mild FP using a median split. To categorize the extent to which targets used CE, expressivity scores were calculated for each target by averaging the compensatory expressive behaviors from Study 1 (inflection, laughter, talkativeness, vocal loudness, gestures, head movements, trunk movements, leg movements, and LIWC positive emotion words), for each target. Compensatory expression scores were dichotomized with a median split. By comparing targets with low and high FP, we were able to create a naturalistic comparison group that was composed of people with FP, rather than having a control group of normal targets. Control participants without FP were undesirable because they would differ from participants with FP in appearance, life experience, and ascribed stigma.

Participant Perceivers

Perceivers were 121 Tufts university undergraduate students (60% female, 72% Caucasian, 7% African descent, 16% Asian, 5% Hispanic, 1% Middle Eastern) who completed the study for partial course credit.

Procedure

Perceivers were told that they would be taking part in a first impressions study of people with FP. They were informed that the targets had FP to ensure that all participants had the same level of knowledge about the targets' condition. Otherwise, perceivers assigned to channel conditions that did not include the face would never know that individuals in the videos had a disability. Informing all participants ensured that all participants in each channel condition held a similar level of disability stigma. Importantly, we did not give them any information about FP, such its causes or related symptoms, because this information could serve to educate them and improve their impressions.

They were randomly assigned to one of six channel conditions: *face* (the body was not shown and audio was not played), *voice* (video was not shown and audio was content-filtered), *voice+speech* (video was not shown), *body* (face was not shown and audio was not played), *voice+speech+body* (face was not shown), *all channels* (full audio and video presented) and one of two randomized clip orders. Participants completed a brief demographics questionnaire, and then observed the 54 clips on a computer. After each clip, perceivers rated their impressions of each targets' happiness and sadness on a scale from 1 to 5, with 1 being "not at all" and 5 being "extremely". Participants were debriefed at the end of the study. The study lasted approximately 50 minutes.

Results

Data Analysis Overview

Participants' ratings of the intensity of targets' happiness and sadness ratings were related, $r = -.30$, $p < .05$. We conducted all analyses separately for happy and sad ratings, and they showed the same pattern of results. For simplicity, we chose to use perceivers' ratings of targets' happiness as the dependent variable, because we expected happiness to be the most difficult emotion to detect in FP.

We tested our hypotheses with a 6 (channel: face, body, voice, voice+speech, voice+speech+body, all channels) x 2 (target recall topic; happy or sad) x 2 (severity: severe or mild) ANOVA with repeated measures on the last two factors. The dependent variable was perceivers' ratings of targets' happiness. M and SEs are shown in Figure 3. In order to examine certain interactions, severity bias scores were calculated by subtracting perceivers' ratings of severe targets from their ratings of mild targets for each trait, with higher numbers indicating that perceivers rated people with mild compared to severe FP as happier. Planned pairwise comparisons were conducted.

Severity Bias

The findings support the hypothesis that there is biasing effect of FP severity on perceivers' happiness ratings. There was a main effect of severity, with severe targets rated as less happy ($M = 1.81$, $SE = 0.03$) than mild targets ($M = 2.20$, $SE = .03$), $F(1, 115) = 335.71$, $p < .001$, $\eta_p^2 = .75$.

Channel

A main effect of channel, $F(5, 115) = 16.00$, $p < .001$, $\eta_p^2 = .41$, and planned comparisons indicated that the happiness ratings of perceivers observing the face did not differ from participants in other single channel conditions, but were significantly lower than the ratings of perceivers in multiple channel conditions (face vs. body, $F(1,115) = 1.75$, $p = .19$, $\eta_p^2 = .02$; face vs. voice, $F(1,115) = 1.24$, $p = .27$, $\eta_p^2 = .27$; face vs. voice+speech, $F(1,115) = 18.30$, $p < .001$, $\eta_p^2 = .14$; face vs. voice+speech+body, $F(1,115) = 20.00$, $p < .001$, $\eta_p^2 = .15$; face vs. all channels, $F(1,115) = 16.46$, $p < .001$, $\eta_p^2 = .13$).

Effect of Channel on Severity Bias

A channel x severity interaction, $F(5,115) = 32.13$, $p < .01$, $\eta_p^2 = .58$, indicated that channel moderated the severity bias. As predicted, planned comparisons of severity bias scores indicated the severity bias was greatest in the face only channel compared to all other channel conditions, (face vs. body, $F(1,115) = 107.48$, $p < .001$, $\eta_p^2 = .48$; face vs. voice, $F(1,115) = 117.73$, $p < .001$, $\eta_p^2 = .51$; face vs. voice+speech, $F(1,115) = 79.60$, $p < .001$, $\eta_p^2 = .41$; face vs. body+voice+speech, $F(1,115) = 67.94$, $p < .001$, $\eta_p^2 = .37$; face vs. all channels, $F(1,115) = 36.65$, $p < .001$, $\eta_p^2 = .24$. This pattern shows that severity bias is largest for the face, smallest for channels in which perceivers could not see the face, and in between for the all channels condition. This suggests that perceivers integrated information from all channels when rating happiness, supporting the holistic hypothesis.

Effect of Topic on Severity Bias

An interaction of topic x severity, $F(1,115) = 286.36$, $p < .01$ $\eta_p^2 = .71$, revealed that the severity bias was greater when perceivers observed targets recalling a happy event compared to a sad event. When observing participants recalling a happy topic, perceivers rated targets with severe FP as less happy (M = 2.168, SE = .05) than targets with mild FP (M = 2.88, SE = .04), $F(1,115)$ = 475.07, $p < .001$, $\eta_p^2 = .81$. This pattern was present when observing participants recalling a sad topic, but perceivers' happiness ratings of targets with severe FP (M = 1.45, SE = .03) were somewhat less differentiated from ratings of those with mild FP (M = 1.52, SE = .03), $F(1,115) = 8.55$, $p < .01$, $\eta_p^2 = .07$.

Effect of Topic on the Channel by Severity Interaction

An interaction of topic x channel x severity, $F(5, 115) = 6.98$, $p < .01$, η_p^2 = .23, indicated that topic moderated the channel by severity interaction. In general, access to non-face channels reduced severity bias more when viewing sad recall than happy recall, particularly when comparing the face and all channel conditions. Planned comparisons of severity bias scores for the face channel compared to each other channel condition were conducted separately for the happy and sad topics. When observing targets recalling a happy event, the severity bias was greatest in the face only condition compared to every other channel condition (face vs. body, $F(1,115) = 71.71$, $p < .001$, $\eta_p^2 = .38$; face vs. voice, $F(1,115) = 55.26$, $p < .001$, $\eta_p^2 = .32$; face vs. voice+speech, $F(1,115)$ = 27.70, $p < .001$, $\eta_p^2 = .19$; face vs. voice+speech+body, $F(1,115) = 20.41$, $p <$ .001, $\eta_p^2 = .15$; face vs. all channels, $F(1,115) = 6.43$, $p = .01$, $\eta_p^2 = .05$. The difference in severity bias between the face only condition and other channels was even more marked for the sad topic (face vs. body, $F(1,115) = 48.14$, $p < .001$, $\eta_p^2 = .30$; face vs. voice, $F(1,115) = 83.66$, $p < .001$, $\eta_p^2 = .42$; face vs. voice+speech, $F(1,115) = 74.00$, $p < .001$, $\eta_p^2 = .39$; face vs. voice+speech+body, $F(1,115) = 73.17$, $p < .001$, $\eta_p^2 = .39$; face vs. all channels, $F(1,115) = 51.66$, $p < .001$, $\eta_p^2 = .31$). This indicates that people with severe relative to mild FP are at a disadvantage specifically when expressing happiness, but the groups are viewed similarly when they are expressing sadness.

Compensatory Expression

In line with the holistic hypothesis, we expected that targets who use more compensatory expression would be rated as happier during happy recall relative to targets who use less compensatory expression, because this would indicate that perceivers are able to integrate expression from channels other than the face into their ratings. We conducted our analysis specifically on perceivers' ratings of targets discussing a happy topic because we found that the severity bias was strongest for the happy topic. We conducted a 2 (compensatory expression) x 2 (severity) repeated measures ANOVA on perceivers' ratings of targets' happiness. Only perceivers observing all channels were able to observe all compensatory expressions; thus, we included only those perceivers. There was a main effect indicating that targets who used more compensatory expression were viewed as happier overall, $F(1,21) = 6.38$, $p = .02$, $\eta_p^2 = .23$. The interaction of compensatory expression x severity was not significant, $F(1,21) = .00$, p = .96, $\eta_p^2 = .00$.

Discussion

This study was the first to examine the way social perceivers judge the emotions of people with FP. Despite the fact that targets with severe FP reported being happier than targets with mild FP in Study 1, perceivers rated targets with severe FP as much less happy than targets with mild FP, with a very large effect. This severity bias indicates that perceivers overgeneralized an inexpressive face to indicate less happiness, even though this was not a valid cue when rating the emotions of people with FP. This is the first study to document this severity bias in emotion judgments, but it compliments previous findings of studies of PD in which individuals with expressive masking are viewed as having more negative personality traits than individuals without masking.

We expected that perceivers who only viewed the face would rate targets as less happy than perceivers who had access to other channels. This is because the face should be the least informative channel. However, we found a slightly different pattern of results. The ratings of perceivers observing the face only did not differ from the ratings of perceivers in the other single channel conditions. However, perceivers viewing the face only rated targets as significantly less happy compared to perceivers viewing multiple channels. This indicates that people perceive more happiness when more channels of information are available, which supports the holistic hypothesis.

We found that the channel perceivers observed moderated their severity bias. As we predicted, the severity bias was greatest in the face only condition compared to all other channel conditions. When perceivers had no information on which to base their impressions except the face, they rated people with severe FP as much less happy than those with mild FP. When the face was not visible, the severity bias was smallest. In support of the holistic hypothesis, when perceivers had access to all channels, their judgments appeared to be a blend of intensities of the face and the other expressive channels.

Even when perceivers could not see the face, in the voice, voice+speech, and voice+speech+body conditions, they showed a severity bias. How is it possible for perceivers to show a severity bias even when they are not aware of the extent of the targets' FP? Although we excluded participants who did not have understandable speech, severe targets may have had subtle decrements in vocal expressivity and speech clarity due to their conditions, which could contribute to the severity bias in conditions involving voice or speech. To examine this possibility, we compared ICRP ratings from Study 1 of inflection and articulation (the clearness and understandability of speech). Indeed, targets with severe FP had significantly poorer articulation, $F(1,25) = 16.16$, $p < .001$, $\eta_p^2 = .39$, and may have had slightly less inflection (a nonsignificant difference of small magnitude), $F(1,25) = 1.16$, $p = .29$, $\eta_p^2 = .04$. It is important to note, however, that even though perceivers showed a severity bias in the voice, voice+speech, and voice+speech+body conditions, the presence of these channels in the all channels condition reduced severity bias, suggesting that these channels are still beneficial in reducing the high levels of severity bias associated with the face.

As predicted, severity bias was larger when perceivers were observing targets recall a happy event than when observing targets recall a sad event, indicating that people with severe FP are at a particular disadvantage when expressing happiness. Happiness should be particularly challenging to recognize in FP because it involves a large amount of facial activity (Ekman, 1989; Wallbott & Scherer, 1986), while sadness involves less activity all over and may be better detected through speech (Wallbott & Scherer, 1986). Indeed, one of the primary concerns among people with FP is the lack of a smile (Bogart et al., 2012).

Access to non-face channels reduced the severity bias, especially when rating a sad topic. This is consistent with the findings of Barkhuysen et al. (2010) and Wallbott and Scherer (1986) that happiness recognition was best when perceivers were viewing the face, and sadness recognition was best when observing all channels or voice and speech.

Perceivers in the face only condition were not able to tell whether a target with severe FP was recalling a happy or sad event, as shown by the very low happiness ratings for each topic. This indicates that the faces of people with FP are seen as sad by default, but the addition of other channels expressing happiness helps others to see them as happy. When rating people with mild FP, perceivers were able to correctly tell whether they were happy or sad in every channel condition except body, but when rating people with severe FP, they could not tell whether they were happy or sad when observing channel conditions that did not include speech (i.e. face, body, or voice). This suggests that speech content is crucial for social perceivers to understand the emotions of people with severe FP.

The finding that perceivers rated targets who used more compensatory expression as happier than targets who used less, regardless of the severity of their FP, is further evidence that perceivers are able to integrate emotional information from channels other than the face when forming emotional judgments. Compensatory expression may be a useful strategy for people with FP to improve others' recognition of their emotions and to facilitate social interaction.

In conclusion, our results show that people with FP are often misperceived as being unhappy. These results add to the holistic emotion perception literature by showing that when perceivers encounter people with FP, they integrate information from multiple channels when making judgments about their emotions.

Study 3: Social Perception of the Personality Traits of People with Facial Paralysis

Study 2 showed that social perceivers rate people with severe FP as less happy than those with mild FP, suggesting that perceivers overgeneralize a paralyzed face to signal unhappiness (Zebrowitz, 1997). We also found that perceivers form impressions holistically, based on a combination of the face, body, and voice. In Study 3, we examined whether perceivers also overgeneralize an inexpressive face to signal less desirable personality traits. We also examined whether perceivers integrate information from multiple channels holistically, as we found for emotions in Study 2, or whether judgments are based primarily on the face.

Emotion expressions signal immediate behavior, and the natural temporal extension of this is communication of a person's behavioral tendencies or personality traits. People make judgments about emotions and traits simultaneously, and sometimes use emotion cues when forming trait impressions (Hall, Gunnery, & Andrzejewski, 2011). Perceivers show overgeneralization effects when rating traits of targets whose static facial appearance resembles emotional expressions (Montepare & Dobish, 2003; Zebrowitz, 1997). Previous work in our lab has found that perceivers make overgeneralization errors when forming impressions of the Big Five traits of targets with PD and masking (Tickle-Degnen & Lyons 2004; Tickle-Degnen et al., 2010). People with masking are rated more negatively and less accurately than those without masking.

Happiness and smiling signal extraversion and a willingness to socialize (Knutson, 1996; Montepare & Dobish, 2003), and this effect persists cross-culturally (Matsumoto & Kudoh 1993). Faces that appeared to move and form a happy expression (by splicing a photograph of a happy facial expression between images of the person showing a neutral expression) were rated as more affiliative than faces that did not move (a single neutral expression; Knutson, 1996).

Hall, Gunnery, and Andrzejewski (2010) examined the effect of emotional expressions on personality trait inferences. Targets were videotaped in emotion-eliciting situations and perceivers rated targets' personality traits. When targets expressed happiness, perceivers' trait judgments were accurate and resembled ratings of a "typical" student. However, when targets displayed sadness, they were rated as much less extraverted, agreeable, open, and emotionally stable than a "typical" student, and much less extraverted than the targets rated themselves. Thus, people expressing happiness are seen as having normal personalities, but people expressing sadness are seen as aberrant and negative.

Perceivers are typically most accurate when judging extraversion, which they can do with very little information, such as from a still photo (Borkeneau & Liebler, 1992; Naumann, Vazire, Rentfrow, & Gosling, 2009), followed by conscientiousness, and neuroticism (Hall, Andrzejewski, Murphy, Mast, & Feinstein, 2008). Openness judgment accuracy is often poor (Albright et al., 1988; Funder & Colvin, 1988) because it is unlikely to be related to expressive behavior (Ambady et al., 2000). Agreeableness is the least accurately recognized trait (Hall et al., 2008).

Contribution of Channels to Social Perception

Some have argued for "nonverbal primacy" in trait judgments, but the evidence is mixed, and results seem to depend on many factors, such as the characteristics and naturalness of the behavior being judged and the attributes being judged (Noller, 1985). People base their trait judgments on nonverbal information rather than speech or the situation when distracted, suggesting nonverbal information is easier and more automatic than verbal information (Gilbert, Pellham, & Krull, 1988). Perceivers rely more on the face when judging affect or friendliness, and rely more on speech when making cognitive judgments or when information is discrepant (Friedman, 1979).

In a review and aggregation of data, Hall et al. (2008) concluded that overall, accuracy for traits was similar across single and multiple channels, suggesting that redundant information from multiple channels is not necessary for accurate judgments of personality. However, Hall et al.'s (2008) review did not examine accuracy separately for each channel and trait, despite the fact that much research suggests that trait recognition accuracy depends both on the channel and the trait being judged (Borkeneau & Leibler, 1992; Ekman, Friesen, O'Sullivan, & Scherer, 1980). Borkenau and Leibler examined the accuracy of perceivers' trait judgments of targets videotaped walking across the room, sitting down, and reading a newspaper article. Perceivers observed various channels: a still photograph, audio track, video, or all channels. Overall accuracy for all traits was highest when perceivers were viewing all channels. Accuracy in separate channels differed according to the trait being rated. Extraversion was recognized accurately in every channel condition, and accuracy was especially high when viewing all channels simultaneously, suggesting that there are robust cues to extraversion in each channel, and that people are able to combine this information holistically to increase the accuracy of their judgments. Perceivers were accurate in recognizing agreeableness when observing all channels or audio, but not when viewing a still clip or face and body, suggesting that voice is a crucial channel to recognize agreeableness accurately. Perceivers recognized conscientiousness accurately in all channels, video, still, but not in the audio condition, suggesting that visual channels are important to recognize conscientiousness. Perceivers were only accurate in recognizing neuroticism when viewing the video, perhaps suggesting that the crucial information is in these channels, and the audio distracted participants and reduced accuracy. Openness was only recognized accurately in the all channels condition, suggesting that holistic processing may be required to accurately perceive this trait.

The findings on the contribution of multiple communication channels in the perception of personality traits indicate a complex pattern, with some studies showing face dominance, and some showing holistic perception, depending on the channel and attribute being judged. As discussed in Study 2, studying the perception of people with FP is a unique improvement over previous channel integration studies. FP provides a naturalistic avenue to study the way in which perceivers integrate information from multiple communication channels when the face is not expressive. This study extends previous work on trait judgments of people with PD (Tickle-Degnen & Lyons 2004; Tickle-Degnen et al., 2010) by examining the contribution of an inexpressive face and expressive non-face channels to perceivers' trait impressions.

Purpose and Hypotheses

We examined social perceivers' judgments of the Big Five personality traits of people with FP to examine how perceivers integrate a paralyzed face with an expressive body and voice in their personality judgments. We tested two main hypotheses:

1) **Perceivers would show a severity bias when rating the traits of people with FP.** We expected perceivers to show an overgeneralization effect for FP that paralleled the findings of Hall et al. (2011) for personality trait ratings of targets expressing sadness, in that perceivers would rate targets with severe FP as having more negative traits.
2) **Perception of traits in people with FP would be holistic.** Similar to our findings in Study 2, we predicted that perceivers would integrate cues from multiple communication channels when rating the personalities of people with FP, rather than basing their impressions only on the face. We predicted that perceivers who viewed only the face would rate targets as having more negative traits than perceivers who had access to other channels. This is because the face should be the least informative channel. Severity bias would be largest when perceivers only see the face and smaller when observing all channels. Additionally, we predicted that perceivers would rate targets who used more compensatory expressive

behavior as having more positive personality traits than those who use less. This would provide additional evidence for holism.

Method

Overview

The methods for this study were similar to Study 2, except that perceivers rated Big Five personality traits of targets with FP. We chose to show only the happy recall FP clips for this study. In Hall et al.'s (2011) study, targets who recalled happy events were seen to have more normative personalities than targets recalling sad events. However, in Study 2, we found that perceivers showed the greatest amount of severity bias when observing happy recall. Thus, we expected happy recall to elicit a strong severity bias, and that this bias would cause perceivers to make emotion overgeneralizations. Showing targets recalling a happy event was meant to simulate a first impressions situation in which the person with FP is putting their best foot forward, and showing as much positive expressivity as possible. This also shortened the study to approximately 25 minutes. We did not include a content-filtered voice condition in this study in order to reduce the number of participants needed and reduce participant burden.

Target Stimuli

Stimuli were the 27 20 s. clips of people with FP recalling a happy event obtained from Study 1. Targets had reported their personality traits using the TIPI during Study 1.

Participant Perceivers

Perceivers were 102 Tufts university undergraduate students (54% female; 56% Caucasian, 26% Asian, 7% African descent, 6% Hispanic, 4% other, 1% Middle Eastern) who completed the study for partial course credit.

Procedure

Procedures were the same as Study 2 except perceivers were randomly assigned to one of five channel conditions: *face*, *voice+speech*, *body*, *voice+speech+body*, *all channels*. After viewing each clip, perceivers rated their impressions of each targets' personality traits. The rating form was modified from the TIPI to collect other, rather than self, ratings. Response choices ranged from 1 to 7, from disagree strongly to agree strongly.

Results

Data Analysis Overview

In order to determine whether people with severe and mild FP differed in self-reported traits, we conducted one-way ANOVAs on FP severity, separate for each self-reported trait. See Table 2. Targets with severe FP seemed to rate themselves as having slightly less desirable traits than targets with mild FP, however differences were not significant and effects were usually small.

We conducted 5 (channel: face, body, voice+speech, voice+speech+body, all channels) x 2 (severity: severe or mild) ANOVAs with repeated measures on the last factor separate for perceivers' ratings of each Big Five personality trait. To examine interactions, severity bias scores were calculated by subtracting perceivers' ratings of severe targets from their ratings of mild targets for each trait, with higher numbers indicating that perceivers rated people with mild compared to severe FP as happier. Planned comparisons were conducted. Figures 4-8 show *M* and *SE* for each trait.

In order to examine the effect of compensatory expressivity, we conducted 2 (compensatory expression) x 2 (severity) repeated measures ANOVA on perceivers' ratings of each Big Five personality trait. Only perceivers observing all channels were able to observe all compensatory expressions; thus, we included only those perceivers.

Additional analyses are described in Appendix A. These break down the data presented here into two component parts. The first is severity bias controlling for target self-reported personality. The second is accuracy, the degree of association between targets' self reported personality and perceivers' impressions of targets' personality.

Extraversion

Severity bias. The findings support the hypothesis that there is a biasing effect of FP on perceivers' ratings of extraversion. There was a main effect of severity, with severe targets rated as less extraverted (M = 3.49, SE = .06) than mild targets (M = 4.56, SE = .04), $F(1,97) = 477.28$, $p < .001$, $\eta_p^2 = .83$.

Channel. A main effect of channel, $F(4,97) = 2.45$, $p = .05$, $\eta_p^2 = .09$, and planned comparisons indicated that perceivers in the face only condition rated targets with FP as less extraverted than perceivers in the voice+speech condition, $F(1,97) = 3.79$, $p = .05$, $\eta_p^2 = .04$, but perceivers' ratings in the face only condition did not differ from any other channel condition, face vs. body, $F(1,97) = 1.22$, p =

.27, $\eta_p^2 = .01$; face vs. voice+speech; face vs. voice+speech+body, $F(1,97) = .73$, $p = .40$, $\eta_p^2 = .01$; face vs. all channels, $F(1,97) = .05$, $p = .82$, $\eta_p^2 = .00$.

Effect of channel on severity bias. A channel x severity interaction indicated that channel moderated the severity bias, $F(4,97) = 10.31$, $p < .001$, $\eta_p^2 = .30$. Perceivers showed greater severity bias when observing the face only compared to channels not involving the face (face vs. body, $F(1,97) = 32.61$, $p < .001$, $\eta_p^2 = .25$; face vs. voice, $F(1,97) = 10.52$, $p < .01$, $\eta_p^2 = .10$; face vs. body+voice+speech, $F(1,97) = 8.80$, $p < .01$, $\eta_p^2 = .08$. However, perceivers showed the same amount of severity bias whether they were observing the face or all channels, $F(1,97) = .15$, $p = .70$, $\eta_p^2 = .00$. These findings provide support for the face override hypothesis, because perceivers in all channels condition did not seem to incorporate additional information beyond those in the face condition to reduce their severity bias.

Compensatory expressive behavior. Targets who used more compensatory expression were viewed as more extraverted overall, $F(1,16) = 69.46$, $p < .001$, $\eta_p^2 = .81$. There was a significant interaction of compensatory expression and severity, $F(1,16) = 19.98$, $p < .001$, $\eta_p^2 = .56$, indicating that, contrary to our hypothesis, use of compensatory expression increased severity bias. Among targets who used less CE, severe targets were viewed as less extraverted than mild targets, $F(1,16) = 20.65$, $p < .001$, $\eta_p^2 = .56$, and among those who use more CE, the severity bias is somewhat larger, $F(1,16) = 126.69$, $p < .001$, $\eta_p^2 = .89$.

Agreeableness

Severity bias. The findings support the hypothesis that there is a biasing effect of FP on perceivers' ratings of agreeableness. There was a main effect of severity, with severe targets rated as less agreeable (M = 4.39, SE = .06) than mild targets (M = 4.55, SE = .06), $F(1,97) = 14.42$, $p < .001$, $\eta_p^2 = .13$.

Channel. A main effect of channel, $F(4,97) = 4.57$, $p = .00$, $\eta_p^2 = .16$, and planned comparisons indicated that perceivers in the face only condition rated targets with FP as less agreeable than perceivers in the all channels condition, $F(1,97) = 8.61$, $p < .01$, $\eta_p^2 = .08$, but perceivers' ratings in the face only condition did not differ from any other channel condition, face vs. body, $F(1,97) = 1.92$, $p = .17$, $\eta_p^2 = .02$; face vs. voice+speech, $F(1,97) = 1.20$, $p = .28$, $\eta_p^2 = .01$; face vs. voice+speech+body, $F(1,97) = .26$, $p = .61$, $\eta_p^2 = .00$.

Effect of channel on severity bias. A severity x channel interaction indicated that channel moderated the severity bias when rating agreeableness, $F(4, 97) = 8.81$, $p < .001$, $\eta_p^2 = .27$. Perceivers showed greater severity bias when observing the face only compared to channels not involving the face (face vs. body, $F(1,97) = 24.47$, $p < .001$, $\eta_p^2 = .20$; face vs. voice+speech, $F(1,97) = 15.86$, $p < .001$, $\eta_p^2 = .14$; face vs. body+voice+speech, $F(1,97) = 20.89$, $p < .001$, $\eta_p^2 = .18$). However, perceivers showed the same amount of severity bias whether they were observing the face only or all channels, $F(1,97) = 2.53$, $p < .12$, $\eta_p^2 = .03$. These findings provide support for the face override hypothesis, because the additional information in the all channels condition relative to the face only condition did not reduce perceivers' severity bias.

Compensatory expressive behavior. There was no main effect of CE, $F(1,16) = .55$, $p = .47$, $\eta_p^2 = .03$. There was a nonsignificant trend towards an interaction of compensatory expression x severity, $F(1,16) = 4.11$, $p = .06$, $\eta_p^2 = .21$, indicating that the use of compensatory expression reduces severity bias specifically for people with severe FP. People with severe or mild FP who use more compensatory expression are viewed as similarly agreeable, $F(1,16) = .78$, $p = .39$, $\eta_p^2 = .05$, but among those who use less CE, severe targets are viewed as much less agreeable than mild targets, $F(1,16) = 37.92$, $p < .001$, $\eta_p^2 = .70$.

Conscientiousness

Severity bias. The findings support the hypothesis that there is a biasing effect of severity on perceivers' ratings of conscientiousness. There was a main effect of severity, with severe targets rated as less conscientious ($M = 3.89$, $SE = .04$) than mild targets ($M = 4.51$, $SE = .04$), $F(1,97) = 271.82$, $p < .001$, $\eta_p^2 = .74$.

Channel. The main effect of channel was not significant, $F(4,97) = 1.58$, $p = .19$, $\eta_p^2 = .06$.

Effect of channel on severity bias. A channel x severity interaction indicated that channel moderated the severity bias when rating conscientiousness, $F(4,97) = 7.18$, $p < .001$, $\eta_p^2 = .23$. Perceivers showed greater severity bias when observing the face only compared to channels not involving the face (face vs. body, $F(1,97) = 25.37$, $p < .001$, $\eta_p^2 = .21$; face vs. voice+speech, $F(1,97) = 5.10$, $p = .03$, $\eta_p^2 = .05$; face vs. body+voice+speech, $F(1,97) = 7.61$, $p = .01$, $\eta_p^2 = .07$). However, perceivers showed the same amount of severity bias whether they were observing the face only or all channels, $F(1,97) = .76$, $p = .39$, $\eta_p^2 = .01$. These findings provide support for the face override hypothesis, because the additional information in the all channels condition relative to the face only condition did not reduce perceivers' severity bias when rating conscientiousness.

Compensatory expressive behavior. Targets who used less compensatory expression were viewed as less conscientious (*M* = 4.02, *SE* = .10) than those who used more compensatory expression (*M* = 4.57, *SE* = .09), $F(1,16) = 36.91$, $p < .001$, $\eta_p^2 = .70$. The interaction of compensatory expression x severity was not significant, F(1,16) = .89, p = .36, $\eta_p^2 = .05$.

Emotional Stability

Severity bias. Supporting the hypothesis that there is a biasing effect of FP on perceivers' ratings of emotional stability, there was a main effect of severity, with severe targets rated as less emotionally stable (*M* = 4.06, *SE* = .05) than mild targets (*M* = 4.34, *SE* = .06), $F(1,97) = 46.63$, $p < .001$, $\eta_p^2 = .33$.

Channel. There was no main effect of channel, $F(4,97) = 1.94$, $p = .11$, $\eta_p^2 = .07$.

Effect of channel on severity bias. A channel x severity interaction indicated that channel moderated the severity bias when rating emotional stability, $F(4,97) = 10.05$, $p <. 001$, $\eta_p^2 = .30$. Perceivers showed greater severity bias when observing the face only compared to channels not involving the face (face vs. body, $F(1,97) = 26.64$, $p < .001$, $\eta_p^2 = .22$; face vs. voice+speech, $F(1,97) = 6.43$, $p = .01$, $\eta_p^2 = .06$; face vs. body+voice+speech, $F(1,97) = 2.54$, $p = .12$, $\eta_p^2 = .03$). However, perceivers showed the same amount of severity bias whether they were observing the face only or all channels, $F(1,97) = .60$, $p = .44$, $\eta_p^2 = .01$. These findings provide support for the face override hypothesis, because the additional information in the all channels condition relative to the face only condition did not reduce perceivers' severity bias when rating emotional stability.

Compensatory expressive behavior. Targets who used less compensatory expression were viewed as less emotionally stable (*M* = 4.23, SE = .18) than those who used more compensatory expression (*M* = 4.49, *SE* = .14), $F(1,16) = 4.39$, $p = .05$, $\eta_p^2 = .22$. There was a nonsignificant trend towards an interaction of compensatory expression x severity, $F(1,16) = 3.81$, $p = .07$, $\eta_p^2 = .19$, suggesting that the use of compensatory expression reduces severity bias. Among targets who use less CE, those with severe FP are viewed as much less emotionally stable than those with mild FP, $F(1,16) = 28.40$, $p < .001$, $\eta_p^2 = .64$, while among targets who use more CE, the difference between ratings of severe and mild targets is smaller, $F(1,16) = 6.33$, $p = .02$, $\eta_p^2 = .28$.

Openness to Experience

Severity bias. The findings support the hypothesis that there is a biasing effect of FP on perceivers' ratings of openness to experience. There was a main effect of severity, with severe targets rated as less open (*M* = 3.76, *SE* = .06) than mild targets (*M* = 4.25, *SE* = .04), $F(1,97) = 100.73$, $p < .001$, $\eta_p^2 = .51$.

Channel. A main effect of channel, $F(4,97) = 3.94$, $p < .01$, $\eta_p^2 = .14$, and planned comparisons revealed that perceivers observing only the face rated targets as less open to experience compared to perceivers observing voice and speech, $F(1,97) = 12.38$, $p < .001$, $\eta_p^2 = .11$; but they did not differ for any other conditions, face vs. body, $F(1,97) = .04$, $p = .84$, $\eta_p^2 = .00$; face vs.

voice+speech+body, $F(1,97) = 2.44$, $p = .12$, $\eta_p^2 = .02$; face vs. all channels, $F(1,97) = 3.10$, $p = .08$, $\eta_p^2 = .03$.

Effect of channel on severity bias. A severity by channel interaction indicated that channel moderated the severity bias when rating openness, $F(4,97) = 7.18$, $p < .001$, $\eta_p^2 = .23$. Perceivers showed greater severity bias when observing the face only compared to channels not involving the face (face vs. body, $F(1,97) = 21.32$, $p < .001$, $\eta_p^2 = .18$; face vs. voice+speech, $F(1,97) = 10.34$, $p < .01$, $\eta_p^2 = .10$; face vs. body+voice+speech, $F(1,97) = 9.37$, $p < .01$, $\eta_p^2 = .09$). Additionally, perceivers showed more severity bias when observing the face compared to when they were observing all channels, $F(1,97) = 3.94$, $p = .05$, $\eta_p^2 = .04$. Severity bias was larger in the face compared to all channels, suggesting that perceivers were integrating information from all channels when rating openness to experience, supporting the holistic hypothesis for this trait.

Compensatory expressive behavior. Targets with less compensatory expression were viewed as less open to experience ($M = 3.87$, $SE = .10$) than those who used more compensatory expression ($M = 4.27$, $SE = .12$), $F(1,16) = 36.91$, $p < .001$, $\eta_p^2 = .70$. The interaction of compensatory expression x severity was not significant, $F(1,16) = .60$, $p = .45$, $\eta_p^2 = .04$.

Discussion

This study examined perceivers' impressions of the personalities of people with FP, and the way perceivers integrate a paralyzed face with an expressive body and voice when rating their personalities. In line with research on PD (Tickle-Degnen & Lyons, 2004; Tickle-Degnen et al., 2010), we found that perceivers consistently rated targets with severe FP less positively on all Big Five traits compared to targets with mild FP, in most cases with large effects. This effect was strongest for the trait of extraversion, the trait most linked to smiling (Knutson, 1996; Montepare & Dobish, 2003). Our findings extend the work of Hall et al. (2011), who found that targets who were expressing sadness were viewed as less extraverted, agreeable, open, and emotionally stable than targets expressing happiness. Our study demonstrates that this occurs even when the target is expressing happiness if the face does not appear happy.

Importantly, the severity bias effects held strong when we controlled for possible differences in targets' self-reported personality traits. If a difference exists between targets with mild and severe FP, it would interesting to consider the causal direction of why people with severe FP may rate themselves as having less positive traits. The self-ratings of people with severe FP could stem from the negative impressions and responses of others, which may be incorporated into targets' self-concepts.

Although we predicted that perceivers viewing the face only would rate targets with FP more negatively than perceivers in other conditions, we did not consistently find this. Rather, perceivers in the face only condition rated targets as less extraverted and open to experience than those in the voice and speech condition, and perceivers in the face only condition rated targets as less agreeable than those in the all channels condition. Together, these findings indicate that perceivers attribute personality traits relatively equally across most channels.

However, to fully understand the findings, we must examine more nuanced analyses of severity bias by condition and accuracy.

Contrary to our predictions, trait judgments did not show the same extent of holistic judgments that we found in emotion judgments in Study 2, even though participants were observing the same stimuli. The analyses reported in the main text suggest that perceivers base their judgments primarily on the face when it is in view for every Big Five trait except openness to experience. However, the bias analyses controlling for targets' self-reported traits in Appendix A show evidence for holism in extraversion, conscientiousness, and openness to experience. What could account for these differences? It is possible that targets' personality differences were obscuring severity bias in some conditions. That is, some severe targets may have had less positive traits, and because of their severity bias, perceivers happened to rate these targets in an accurate way. Controlling for target personality partialed out this source of error variance, making it easier to detect severity bias. An examination of the effect sizes of severity bias in face only and all channels revealed that controlling for target personality reduced severity bias most in the all channels condition. Perceivers were generally more accurate in the all channels conditionThis suggests the bias coefficient analyses controlled for accuracy, which as described below, was often highest in the all channels condition. Partialing out the error variance associated with target personality also served to increase the power of the analyses. This means it was more likely to find a difference in severity bias between the face only and all channels condition, supporting the holistic hypothesis. Patterns of channel integration when judging emotions and traits will be discussed in the general discussion.

Perceivers in the all channels condition rated targets who used more compensatory expression more positively than targets who used less compensatory expression, regardless of FP severity. Perceivers are able to take compensatory expression into account when judging traits, but are still strongly biased by severe FP. In the case of agreeableness and emotional stability, interactions of severity and compensatory expression indicated that people with severe FP benefitted the most from compensatory expression use.

Perceivers were relatively accurate in detecting individual differences relative to targets' self reports when judging extraversion, emotional stability, and openness to experience. For these three traits, in general, accuracy was greater when more channels were available, paralleling the findings of Borkeneau and Liebler (1992). Perceivers were generally inaccurate in judging agreeableness and conscientiousness. Agreeableness is typically the most difficult trait to judge accurately (Naumann et al., 2009; Hall et al., 2008), and it may be particularly hard to accurately judge warmth when the target is unable to smile. Borkeneau and Liebler's findings suggested that visual cues were important for conscientiousness judgments, thus it is possible that FP hindered accuracy for this trait.

Compared to accuracy studies of PD, perceivers formed far more accurate impressions of the extraversion and emotional stability of people with FP, while agreeableness and conscientiousness were judged less accurately in people with

FP compared to previous studies of people with PD (Lyons et al., 2004b; Tickle-Degnen & Lyons, 2004). (Openness in FP was judged more accurately than one PD study (Tickle-Degnen & Lyons, 2004) and less accurately than the other PD study (Lyons et al., 2004b)). As previously discussed, FP leaves all other channels intact, while PD often restricts expressivity in all channels. These intact channels may have contributed to the more accurate recognition of extraversion and emotional stability in people with FP. Indeed, the main effects of channel when rating these traits indicated that perceivers who had access to more expressive channels were more accurate.

The accuracy findings involving FP severity did not show a consistent, interpretable pattern. Extraversion was the only trait that showed the predicted main effect that severe targets were judged less accurately than mild targets, but in the case of conscientiousness and emotional stability, the opposite was found. In most cases, the effect sizes of channel condition were larger than those of FP severity, thus we place more weight on the findings that conditions with more channels available produced greater accuracy.

In conclusion, these results suggest that people often show a strong overgeneralization effect when rating the Big Five personality traits of people with FP. Perceivers seem to show a stronger pattern of holistic judgments when rating emotions than when rating traits. Compensatory expression is useful for improving perceivers' impressions of the personalities of people with FP. In general, access to more channels increases the ability to accurately detect individual differences in the personalities of people with FP.

Study 4: Training to Improve Perceivers' Impressions of People with FP

Study 1 provided evidence that some people with FP use compensatory expressive behavior in their bodies and voices. Studies 2 and 3 found that social perceivers form negative impressions of the emotions and traits of people with FP. In Study 4, we attempted to train social perceivers to look beyond the face and focus on compensatory channels to improve their impressions of people with FP. Improving perceivers' impressions of people with FP is a unique task because it involves increasing perceivers' interpersonal sensitivity, educating them about a condition for which there is little public awareness, and reducing prejudice for a condition that can be quite stigmatizing (Bogart et al., 2012).

Interpersonal Sensitivity

Interpersonal sensitivity training studies can be categorized into three approaches: practice, education (i.e. about what diagnostic cues to look for), and performance feedback (Hartigan, 2011). In a meta-analysis, Hartigan (2011) found that the single best training method was feedback, followed by practice, then instruction. Studies that combined multiple types of training were most effective (Costanzo, 1992; Hartigan, 2011; Vrij, 1994).

Studies that provide education about diagnostic cues about emotion (e.g. informing participants that movement around the outer corner of the eye signals happiness) have shown only modest effectiveness in improving accuracy (Costanzo, 1992). This may be because people typically use a set of cognitive shortcuts, including the overgeneralizations discussed in previous studies, which are outside of awareness (Ambady et al., 2000; Zebrowitz & Collins, 1997). This sort of education makes social perception explicit, taking perception outside of its natural domain. Studies that provide feedback about the correct response may be more effective than practice or training about diagnostic cues alone (Beck & Feldman, 1989; Elfenbein, 2005) because this feedback may resemble the natural process through which people's perceptions are shaped by their social environment; they learn from the antecedents of their social judgments.

Prejudice Reduction Interventions

Although education in interpersonal sensitivity has previously yielded only modest improvements, it may be useful in the case of FP. In order to form positive, accurate impressions of people with FP, perceivers' may need to be instructed to avoid overgeneralizations and to focus on the body and voice, not the face. Most people have not heard of FP and are not aware of the communication challenges individuals with the condition face. Thus, educating them about the condition will also serve to increase understanding and reduce uncertainty. One factor contributing to perceivers' negative impressions of people with FP is disability stigma (Bogart et al., 2012). Prejudice reduction interventions that educate participants about marginalized groups and suggest how to interpret behavior have shown modest success (Gardiner, 1972; Landis, 1976; Paluck & Green, 2009; Schaller, 1996).

Purpose and Hypothesis

This study tested whether perceivers could be trained to improve their impressions of the extraversion of people with FP. We included an education condition in which we raised participants' awareness about FP and instructed them to base their impressions on the body and voice. Because a combination of types of training has been shown to be most effective (Hartigan, 2011), we included a condition that combined education and feedback. Finally, we included a control condition in which no information about FP was given. We have focused on improving perceivers' impressions of extraversion because Study 3 showed that perceivers show the strongest severity bias towards this trait. Additionally, it is a particularly important trait to recognize when forming first impressions. Our hypothesis was that perceivers in the education+feedback condition would show the most positive ratings and least severity bias when judging the extraversion of targets with severe compared to mild FP, while perceivers in the control condition would show the least positive ratings and the most severity bias.

Method

Participants

Perceivers were 110 Tufts university undergraduate students (67% female) who completed the study for partial course credit. Participants identified as 59% Caucasian, 30% Asian, 8% African descent, 11% Hispanic, 2% Native American, 5% Middle Eastern, and 5% other. (16% reported multiple ethnic identities, thus the percentage breakdown of ethnic identities adds up to more than 100.)

Procedure

The methods for this study were similar to Study 3, except that all perceivers were shown all channels, and were given slightly longer to observe targets (30 s). In the education condition, perceivers were given a short statement describing common causes and symptoms of FP (see Appendix B). It emphasized that people with FP are unable to express themselves with their faces, and instructed perceivers to focus on the body and voice, rather than the face, when rating their impressions. In the education+feedback condition, perceivers were given the education text followed by feedback after they made each of their first 13 ratings about the targets' self-reported extraversion (e.g. "in a self-report questionnaire, the person in the video gave the following answer to this question: I am extraverted and enthusiastic: 'agree strongly.'"). After receiving feedback on the first 13 targets, perceivers were notified that they would no longer receive feedback. The control condition did not include any information about FP.

Data Analysis Overview

We conducted a 3 (training condition: education, education+feedback, control) x 2 (severity) ANOVA with repeated measures on the last factor, on perceivers' ratings of targets' extraversion. Figure 9 shows *M* and *SE*. Analyses of bias controlling for target extraversion and of accuracy are described in Appendix C.

Results

There was a significant main effect of training condition, $F(2,107) = 17.63$, $p < .001$, $\eta_p^2 = .25$, indicating that compared to the control condition, perceivers in the education, $F(1,107) = 18.47$, $p < .001$, $\eta_p^2 = .15$, and education+feedback conditions, $F(1,107) = 32.83$, $p < .001$, $\eta_p^2 = .24$, rated people with FP as significantly more extraverted. Perceivers' ratings in the education and education+feedback conditions did not differ, $F(2,107) = 2.21$, $p = .14$, $\eta_p^2 = .02$.

There was a main effect of severity, indicating that severe targets were rated as less extraverted than mild targets, $F(1,107) = 301.57$, $p < .001$, $\eta_p^2 = .74$. There was no interaction of severity by condition, $F(1,107) = .38$, $p = .68$, $\eta_p^2 = .01$, indicating that there was no difference in severity bias across conditions.

Discussion

Both education and education+feedback improved the positivity of perceivers' ratings of the extraversion of people with FP, but these trainings were not successful in reducing severity bias or improving perceivers' accuracy in detecting individual differences in extraversion among people with FP. Education and education+feedback seemed to be equally effective in improving the positivity of perceivers' impressions. This study replicated our previous findings that perceivers are particularly biased and inaccurate when rating people with severe FP.

This pattern of results suggests that education motivated perceivers to make a conscious effort to be less biased, but that training did not improve the more challenging and perhaps more implicit tasks of accurately detecting individual differences in targets' extraversion and reducing severity bias. As predicted, education may have been particularly useful because it may have reduced prejudice by raising awareness and reducing uncertainty about this poorly understood condition. Further, it instructed perceivers to change the way they focus their attention when forming impressions to suit the particular task of forming impressions of people with FP. It is likely that social desirability and motivation played a part in these findings; when it was made salient to participants that people with FP have difficulty communicating with their faces, perceivers may have consciously tried to reduce their stereotyping. Indeed, many participants left comments at the end of Study 4 indicating that they were not previously aware of the communication difficulties of FP, that they appreciated learning about the condition, and that they were motivated to form more accurate impressions. Thus, the education text may be useful for raising awareness and reducing overt stereotyping of people with FP, but more research is needed to develop trainings to address other aspects of social perception of FP.

General Discussion

This research presented an in-depth analysis of the expressive behavior used by people with FP and the way others interpret those behaviors to form impressions of them. In Study 1, we measured the expressive verbal and nonverbal behavior of people with FP and found that people with congenital FP used more compensatory expression than people with acquired FP. This study contributes to literature on adaptation to disability as the first study, to our knowledge, to compare the behavior of people with congenital and acquired disabilities. It suggests that people with congenital FP have more adaptations than people with acquired FP. This may due to the fact that they have lived with their conditions for a long time, or it may be because they went through their initial development with their conditions. The adaptation of people with FP is shaped by their social ecology (Livneh & Antonak, 1997). That is, their compensatory expression is shaped by others' responses to them. Indeed, Studies 2 and 3 found that people do form more positive impressions of the emotions and personality traits of people who use more compensatory expression.

We consistently found a large severity bias effect such that people with severe FP were rated less positively on emotions and personality traits. This suggests that social perceivers are prone to overgeneralizing a paralyzed face to indicate unhappiness and an undesirable personality (Zebrowitz & Collins, 1997). In particular, perceivers showed the strongest severity bias for extraversion (η_p^2 = .83) and happiness when targets were recalling a happy event (η_p^2 = .81).

There may be several other factors contributing to the severity bias found in this study. Due to the stigma associated with FP (Bogart et al., 2012), people may rate severe targets more negatively overall. A related factor could be affective forecasting error, or the tendency to incorrectly predict one's future emotions (Gilbert et al., 1998). When non-disabled people are asked to predict how they would feel if they became disabled, they predict they would be much sadder than people with disabilities self-report (Hurst et al., 1994; Ubel et al., 2001). Thus, it is possible that perceivers are projecting the way they think they would feel onto targets with severe FP and rating them as less happy accordingly. We attempted to reduce this possibility by using people with mild and severe FP as comparison groups, rather than comparing people with FP to controls without FP. By comparing people with different severities of FP, we know that both groups are subject to stigma and affective forecasting errors to some extent.

The holistic hypothesis predicted that perceivers would show a stronger severity bias in the face only condition compared to the all channels condition, indicating that perceivers incorporate information from channels other than the face when available. Taken together, Studies 2 and 3 suggest that channels are integrated holistically to some extent for many social attributes. Comparing Studies 2 and 3, perceivers' ratings of targets' happiness recalling a sad event showed the greatest holism effect, a large effect of $\eta_p^2 = .30$, followed by perceivers' ratings of targets' happiness recalling a happy event, a small effect of $\eta_p^2 = .05$. Personality traits seemed to be judged less holistically, and the extent to which perceivers judged personality traits holistically varied depending on whether or not targets' self-reported traits were controlled.

The finding that emotion judgments may have involved a greater extent of holism than personality judgments may be explained by the theory that emotion perception may be a purer and more evolutionarily basic process than trait perception (Schmidt & Cohn, 2001). It may be adaptive to detect emotion cues from as many channels as possible in a holistic manner. Trait perception likely involves a great deal of reliance on stereotyping (Zebrowitz & Collins, 1997). Perceivers may have relied heavily on disability stereotypes associated with the face when rating traits.

There are several caveats to consider when comparing the emotion and trait results. In the emotion study, speech appeared to be a particularly helpful cue. Speech provided especially useful information in that study, since targets were describing emotional events. However, speech may have been less useful when rating traits, since targets were talking about a specific event, rather than their behavioral tendencies.

Holism is the alternative hypothesis (i.e. that there will be a difference in severity bias between perceivers in the face only and all channels) and face override is the null hypothesis (i.e. that severity bias will not differ between perceivers in the face only and all channels). We can only test the extent to which perceivers form impressions holistically, but it is not appropriate to test a null result, which is highly reliant on sufficient power. As such, it is important to consider power in these studies. The emotion perception study had 19 more participants than the trait perception study because the emotion study included a voice channel condition. Thus, it is possible that there were power issues in the trait that prevented detecting a difference in severity bias between the face only and all channels conditions. However, this is not likely because the effect sizes of the severity bias scores comparing perceivers in the face only condition to the all channels condition were indeed smaller for the trait ratings than the emotion ratings. Additionally, partialing out targets' traits when analyzing perceivers' impressions increased power, which may have contributed to the increased holism findings in these analyses.

In Study 4, we found that educating perceivers about FP and instructing them to focus on the body and voice when forming impressions improved the positivity, but not the severity bias or accuracy of their impressions. Adding feedback about whether their impressions were correct did not seem to improve impressions over and above the education condition. This pattern of results suggests that education lead perceivers to consciously reduce their stereotyping, but training was not successful in improving the more difficult and implicit tasks of improving severity bias and accuracy. These findings parallel Kleck's (1969) two-factor model of response to disability. When interacting with people with disabilities, people will modify behaviors that are under conscious control to conform to social desirability of not appearing prejudiced. However, behaviors that are not readily under conscious control, such as nonverbal behavior, remain negatively biased.

The FP stimuli for the social perception studies in the present research were more ecologically valid than the stimuli used in most social perception studies. The individuals with FP were not actors, but rather, lay people telling emotional stories. The social perception tasks could be likened to overhearing a person with FP telling a story about an emotional event at a party. Although one may argue that perceivers may form better impressions if the target clips were longer, many studies have shown that this is a sufficient amount of time for people to make accurate first impressions (Ambady & Rosenthal, 1992). In Study 4, clips were somewhat longer (30 s. instead of 20 s.), and the ratings in comparable groups remained similar. Unfortunately, if a perceiver forms a negative impression within the first 20 or 30 seconds, he or she may decide to avoid a person with FP based on this snap judgment, and may never have the opportunity to adjust his impression. If the perceiver does interact with the person with FP, his or her impression may be anchored by the initial judgment (Epley & Gilovich, 2006).

Future Directions

Due to the extreme dearth of research on FP, there is a need for research in many areas. In regard to our study on adaptation to disability, although a control group was not necessary to test the hypothesis that people with congenital FP display more compensatory expressivity relative to people with acquired FP, future research could include a control group of people without FP to examine whether one or both of the FP groups displays more expressivity relative to the typical population. There is a surprising lack of behavioral studies examining the role of condition onset in adaptation to disability; we hope that this study inspires researchers to examine this among other populations of people with disabilities and health conditions. More research is needed to determine the mechanism leading to better adaptation in people with congenital conditions. Does adaptation depend on the length of time with the condition, or is there a critical period at birth or early in development that leads to optimal adjustment? Future research could reveal useful compensations that could be taught to people who are having difficulty adapting to their conditions.

It would also be interesting to examine perceivers' impressions of other attributes, such as other basic emotions (anger, contempt, disgust, fear, and surprise), intelligence, and likeability. Although people with FP report being particularly concerned with their ability to communicate happiness (Bogart et al., 2012), communicating these other attributes is crucial in everyday interactions and should not be overlooked. For example, if perceivers cannot recognize anger in a person with FP, the person may be perceived as passive. An unresponsive face may be mistaken as a sign of unintelligence (Bogart et al., 2012).

As described earlier, the people with FP in these studies had a range of conditions. The etiology and onset of FP is undetectable to a lay perceiver at first acquaintance. Although we found differences between people with congenital and acquired FP in expressive behavior in Study 1, we chose not to compare perceivers' ratings of congenital vs. acquired targets, because this is not a readily apparent distinction to a social perceiver. People with congenital FP had generally more severe FP and used more compensatory expression, and thus were more likely to fall into these categories in the social perception studies. The only detectable features of FP to social perceivers are severity and laterality. The present social perception studies found that severity had a substantial effect on the way individuals with FP are perceived. However, whether FP is unilateral or bilateral may also be an important factor for the way the person is perceived, and is an important area of future study. Although the social functioning of people with unilateral and bilateral FP has not been compared, both groups have been found to experience significant social disability (Bogart & Matsumoto, 2010; Coulson et al., 2004). Even though people with unilateral FP are able to move one side of their face, it may be difficult for others to interpret their expressions correctly. For example, a unilateral smile may not be recognizable as a smile, but rather, it may look like a contempt expression (Ekman & Friesen, 1986). Additionally, asymmetrical expressions may be particularly disfiguring, since symmetry is an important component of attractiveness (Rhodes, Yoshikawa, & Clark, 2003).

A look through Brunswik's (1955) lens model may be the key to better understanding the somewhat inconsistent accuracy findings in Study 3. Brunswik's lens model is based on Tolman and Brunswik's (1935) observation that unseen internal attributes may be related to observable behaviors. A modified version of the lens model has been used in interpersonal perception research to conceptualize the role of behavioral cues in person perception (Bernieri et al., 1996; Gifford, 1994; Lyons et al., 2004a). It yields accuracy coefficients, cue validities, and cue utilities. Cue validity represents the cues available in the targets' behavioral stream that are associated with self-reported personality. Cue utility represents the targets' behavioral cues that are associated with practitioner judgments. Examining cue validity and utility would show the behaviors used by people with FP as cues to their personality, and the way perceivers "used" these behaviors to form impressions about them. Lens model research on PD has shown that perceivers rely heavily on the face as a cue, even when it is not valid (Tickle-Degnen & Lyons, 2004). A lens model analysis would also allow us to address many of the future directions noted above by examining, in a more nuanced way, the contribution of many factors to perceivers' accuracy, such as FP severity, laterality, compensatory expression, and articulation.

Higher powered studies should examine the more nuanced questions as to whether there are culture and gender differences in use of compensatory expression by people with FP, and whether perceivers' judgments differ according to target and perceiver culture and gender. In their cross-cultural study of perception of American and Taiwanese men and women with PD, Tickle-

Degnen and colleagues (2011) found that women, particularly Americans, were rated more negatively due to masking compared to men. They concluded that this was due to perceived violations of social norms expecting American women to be more expressive than the other groups. A similar pattern may emerge for perceptions of FP. However, it is possible that certain people with FP, perhaps American women, may be particularly adept in developing compensatory expression, which may moderate this effect.

Future studies are needed to examine how perceivers' ratings of people with FP would translate into real world attitudes, emotions, and behaviors. Interaction studies would be an ideal next step to examine the behavior of both the person with FP and the person interacting with the person with FP, and how they might be related. For example, it would be interesting to examine behavioral mimicry in these sorts of interactions (Chartrand & Bargh 1999).

An important question is whether training changes participants' attention patterns away from the face to the body. We are currently testing this with an eyetracking study. Previous eyetracking studies have found that training can change attention patterns to emotional stimuli (Isaacowitz & Choi, 2011). More research is needed to determine other strategies to improve peoples' impressions of people with FP. The effectiveness of such training in improving healthcare practitioners' and educators' interactions with people with FP could be assessed by surveying the person with FP, or looking at health and education outcomes of these individuals.

Implications for interventions. This dissertation provides evidence that two lines of interventions would be useful: one focused on the person with FP, and one focused on the person interacting with the person with FP. For the person with FP, a social skills program like the one developed by UK Charity Changing Faces, a group workshop for people with visible difference involving instruction, modeling, role play, feedback, and group discussion (Robinson et al., 1996), could be modified to encourage the use of the compensatory expressive behaviors identified in this research. A preliminary study of the Changing Faces intervention suggested that, after participating, individuals felt reduced distress and increased confidence when meeting new people (Robinson et al., 1996). There is a paucity of evidence-based interventions for people with FP or visible difference (Bessell & Moss, 2007). We encourage developing and testing such an intervention, which could be useful for people with many types of FP and facial difference, particularly those with acquired conditions who may have difficulty adapting.

For the person interacting with the person with FP, our results suggest that an education program could be useful to reduce raise awareness of and reduce stigma for people with FP. Because the feedback in this study did not seem to further benefit perceivers, it could be omitted from interventions due to the relative complexity it would take to deliver. The information used in this study to educate perceivers was brief and could be delivered in pamphlet form. It could be given to healthcare practitioners and educators who may interact with people with FP as a simple way to raise awareness and reduce bias against people with FP.

Table 1

Participant Characteristics

	Congenital FP	Acquired FP
Total *n*	13	14
Male *n*	5	4
Unilateral *n*	2	14
Age in years *M (SD)*	43.54 (14.32)	45.57 (11.24)
Age range in years	23 - 62	32 - 60
Duration in years *M (SD)*	43.54 (14.32)	11.79 (9.76)
Duration range in years	23 - 62	0 - 31
FP severity *M (SD)*	1.68 (.59)	2.67 (.48)
HADS Depression *M (SD)*	3.69 (2.90)	4.43 (4.20)
Ethnicity	12 Caucasian, 1 African American	12 Caucasian, 2 Hispanic
Percent with college degree	77%	79%
Percent employed	77%	64%

Note. FP severity is the average of 5 raters' ratings of facial expressivity on a scale from 1 to 5, with higher numbers meaning more expressivity.

Table 2

Targets' Self-Reported Personality Statistics

Trait	Severe FP	Mild FP	Significance test
Extraversion	3.93 (.54)	4.87 (.49)	$F(1,25) = 1.64$, $p = .21$, $\eta_p^2 = .06$
Agreeableness	5.50 (.27)	5.81 (.33)	$F(1,25) = .52$, $p = .48$, $\eta_p^2 = .02$
Conscientiousness	5.04 (.38)	5.96 (.24)	$F(1,25) = 4.02$, $p = .06$, $\eta_p^2 = .14$
Emotional stability	4.89 (.42)	5.35 (.43)	$F(1,25) = .57$, $p = .46$, $\eta_p^2 = .02$
Openness to experience	5.46 (.29)	5.65 (.31)	$F(1,25) = .20$, $p = .66$, $\eta_p^2 = .01$

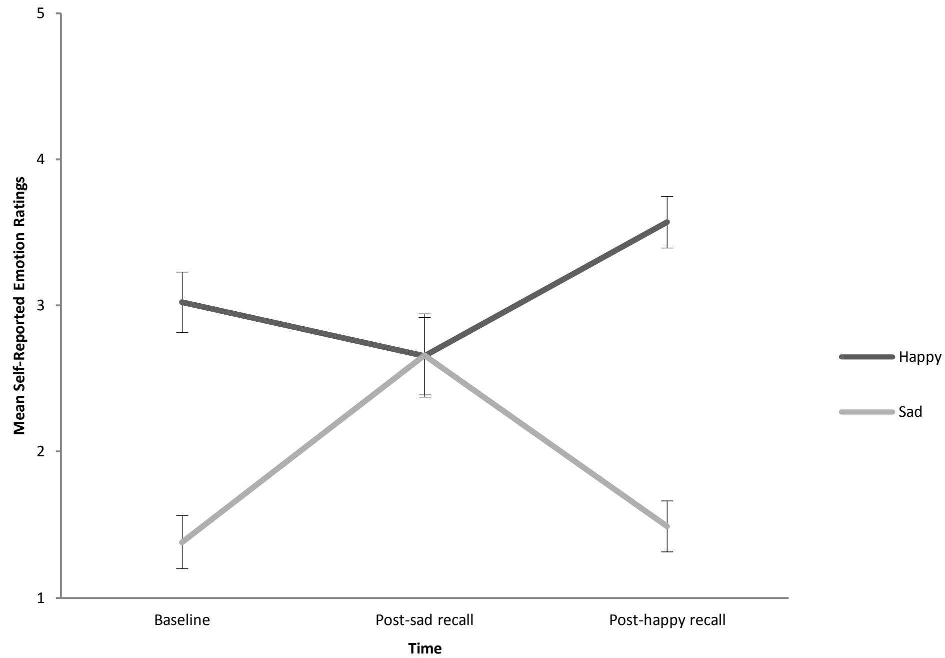

Figure 1. Manipulation check showing change in self-reported emotion during autobiographical recall. Ratings are self-reports of emotion intensity on a scale from 1 to 5, with higher numbers indicating a greater intensity of emotion. Error bars represent standard errors.

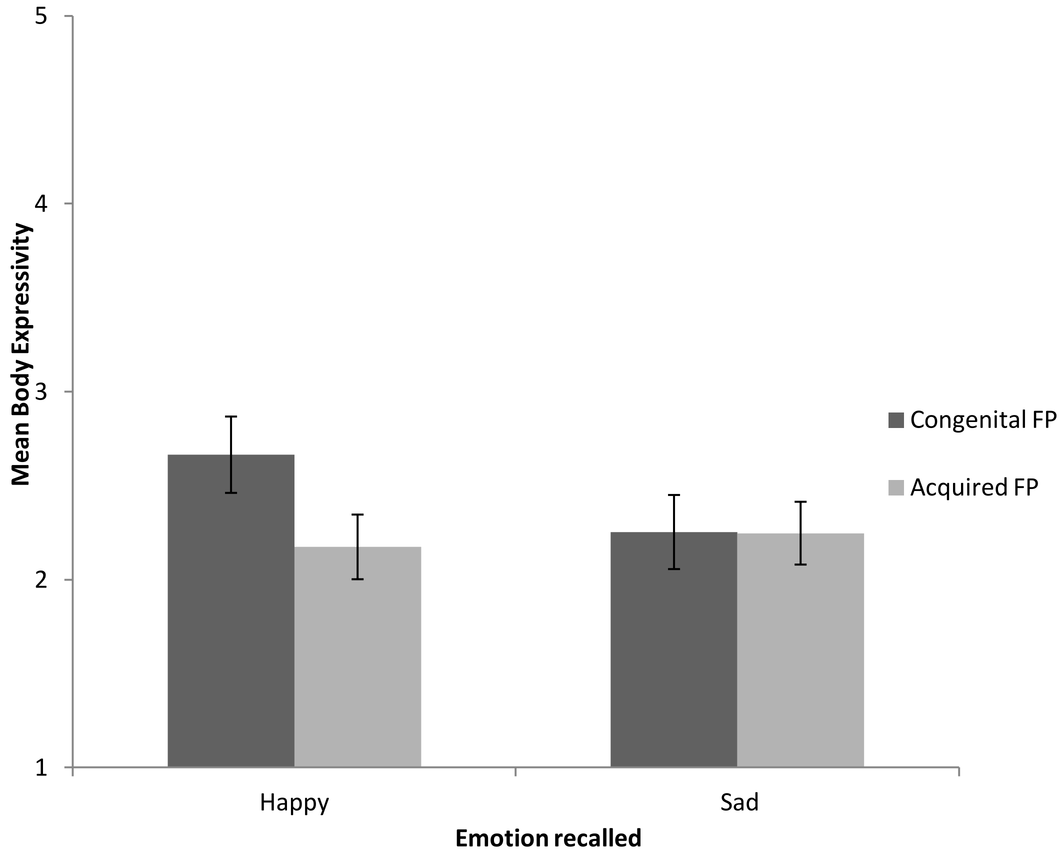

Figure 2. Interaction of FP onset and emotion recall on body expressivity. Possible body expressivity composite rating scores ranged from 1 to 5, with higher scores indicating more expressivity. Error bars represent standard errors.

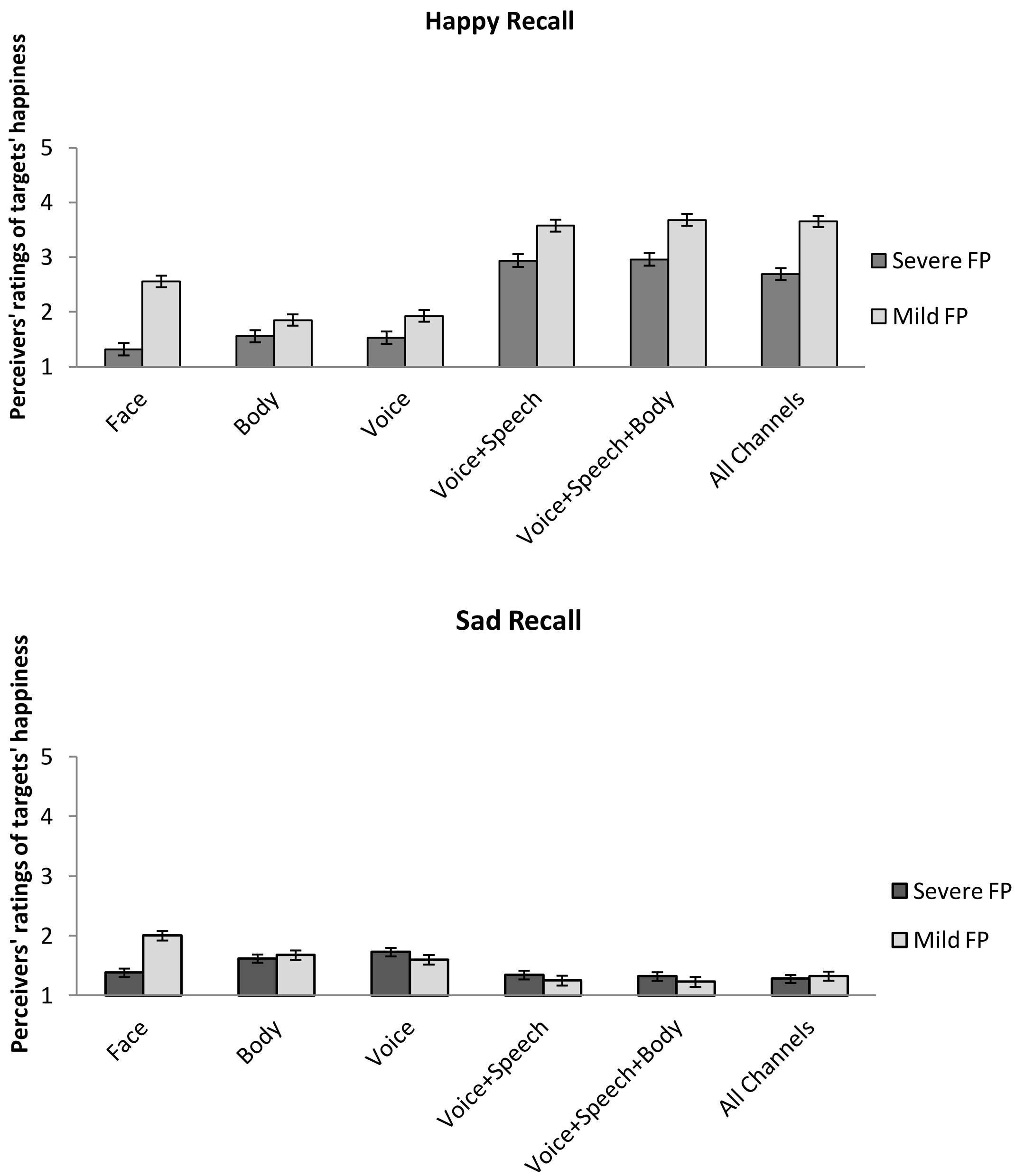

Figure 3. Effect of channel and severity on perceivers' ratings of targets' happiness, separate for when targets were recalling a happy topic or a sad topic. Error bars represent standard errors.

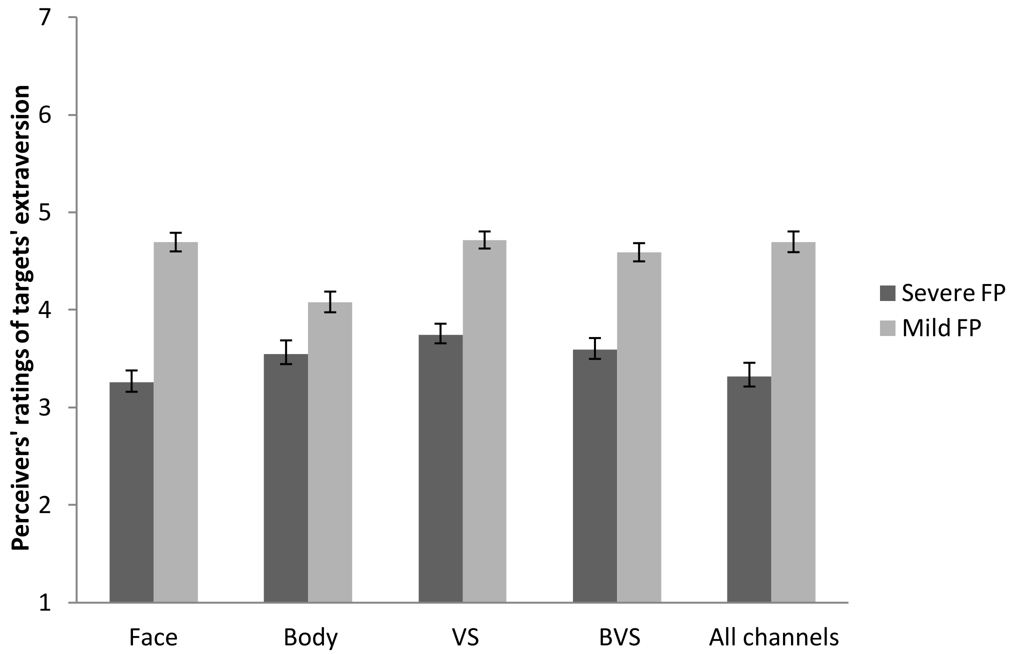

Figure 4. Effect of channel and severity on perceivers' ratings of targets' extraversion. VS is voice+speech. BVS is body+voice+speech. Error bars represent standard errors.

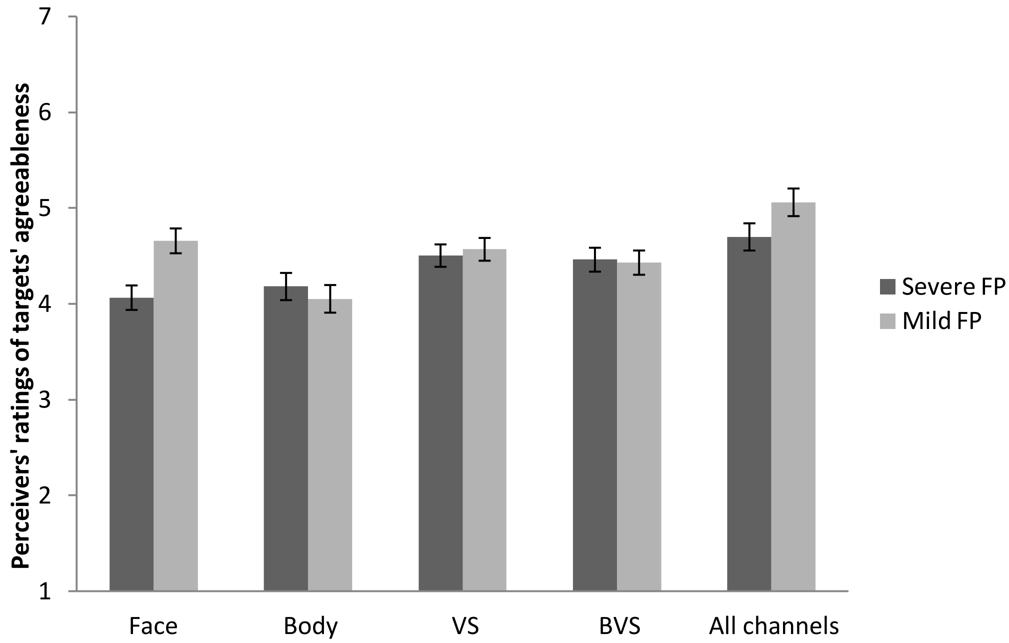

Figure 5. Effect of channel and severity on perceivers' ratings of targets' agreeableness. VS is voice+speech. BVS is body+voice+speech. Error bars represent standard errors.

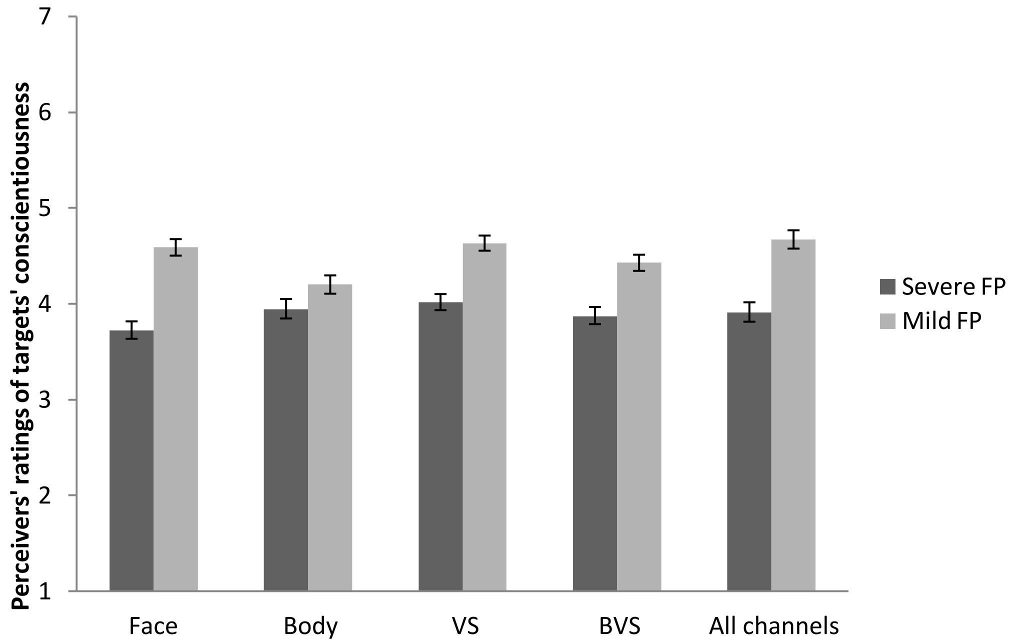

Figure 6. Effect of channel and severity on perceivers' ratings of targets' conscientiousness. VS is voice+speech. BVS is body+voice+speech. Error bars represent standard errors.

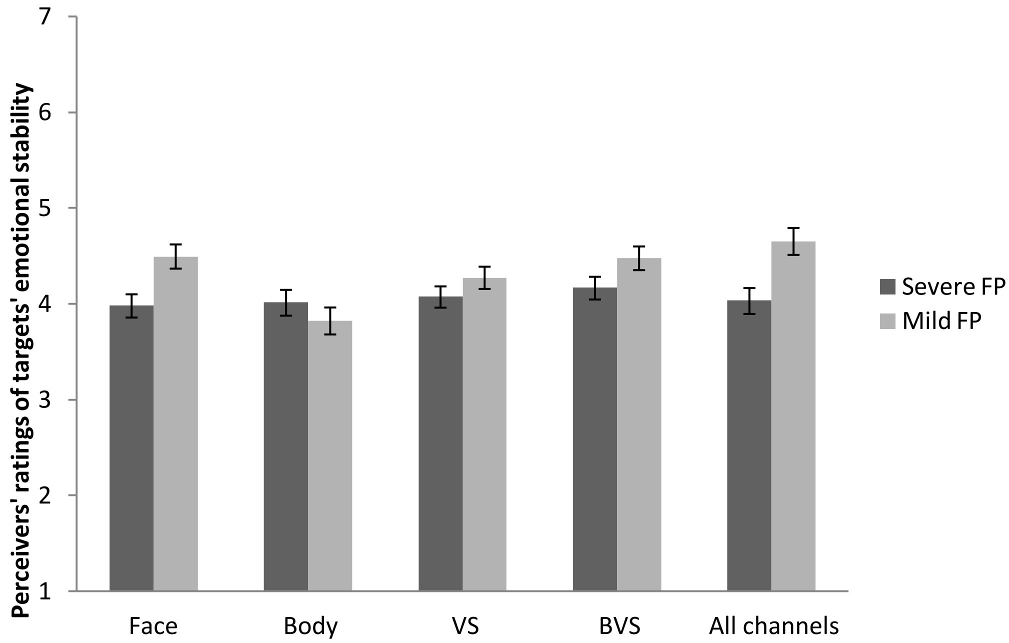

Figure 7. Effect of channel and severity on perceivers' ratings of targets' emotional stability. VS is voice+speech. BVS is body+voice+speech. Error bars represent standard errors.

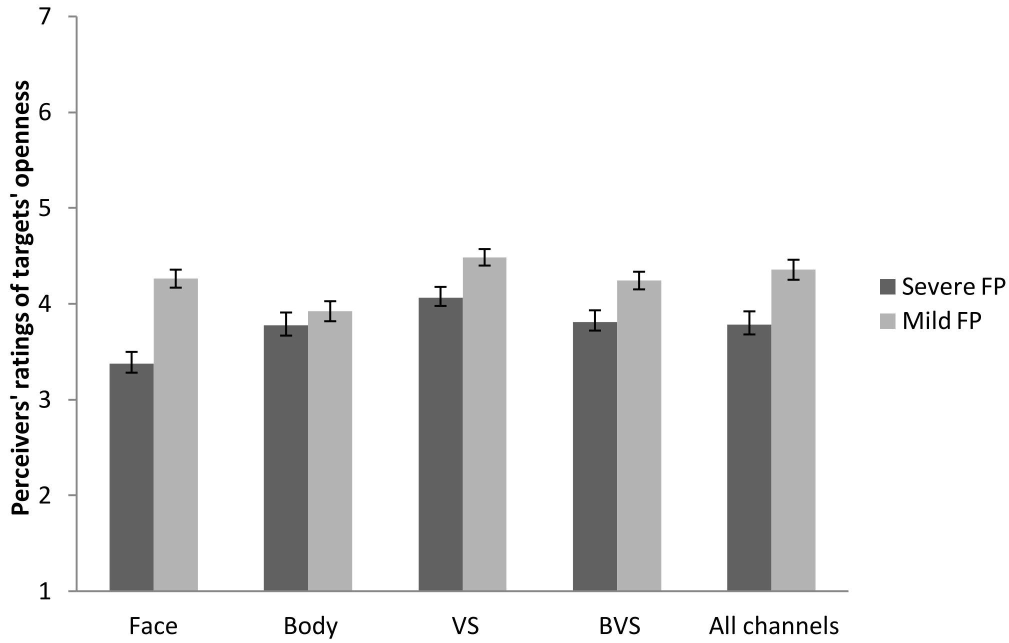

Figure 8. Effect of channel and severity on perceivers' ratings of targets' openness to experience. VS is voice+speech. BVS is body+voice+speech. Error bars represent standard errors.

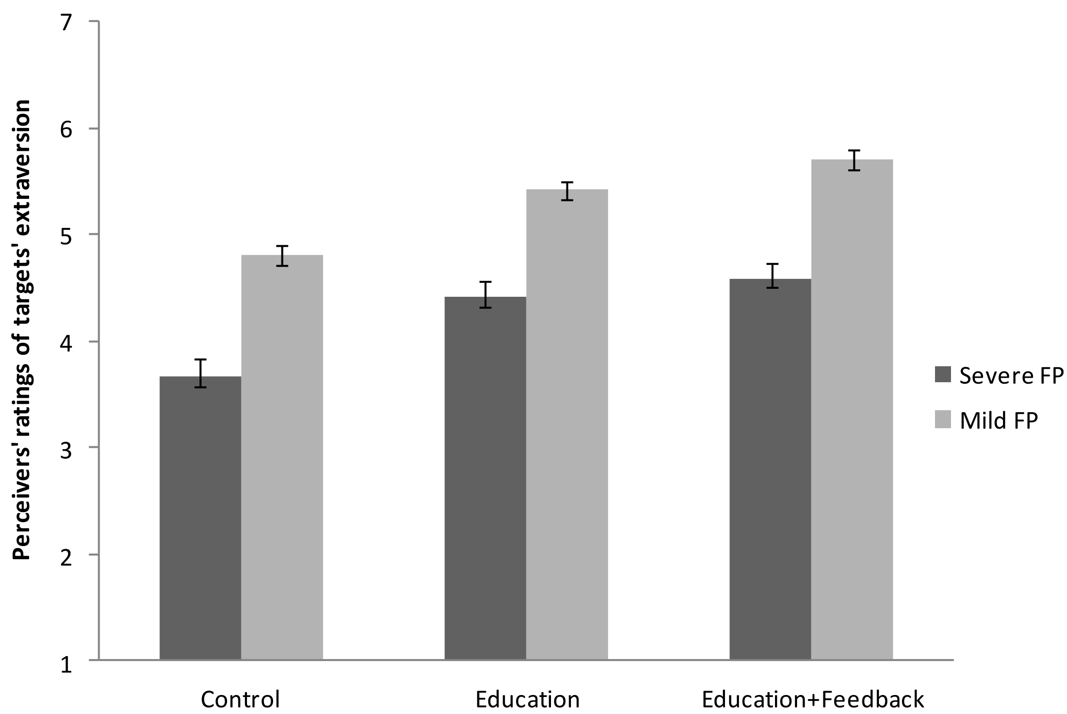

Figure 9. Effect of training and severity on perceivers' ratings of targets' extraversion. Error bars represent standard errors.

Appendix A: Separating Bias and Accuracy for Trait Judgments

This appendix describes in-depth analyses of perceivers' ratings of targets' traits, breaking down perceivers' raw score ratings that were presented in the main text into their component parts: *bias controlling for targets' self-reported traits* and *accuracy*. This is particularly useful because of potential differences in targets' self-reported traits.

Bias is distinct from *accuracy* in impression formation research (Funder, 1995). In this study, bias is defined as perceivers' tendency to rate people negatively based on the severity of their FP, regardless of targets' actual traits. Bias is typically calculated as a mean of perceivers' ratings of multiple targets and does not measure the ability to detect individual differences in targets. This is how it was calculated in the main document. However, targets may have had differences in self-reported traits that could obscure our ability to detect perceivers' bias. Although there were no significant differences between targets with severe and mild FP in their self-reported traits, there was a marginally significant result indicating that targets with severe FP were less conscientious than those with mild FP. This showed a medium effect size. It was observed that targets with severe FP seemed to have scored slightly lower than targets with mild FP on many other traits. Thus, perceivers' severity bias when judging traits could be a correct recognition of differences in personality traits between targets with severe and mild FP. The analyses in this appendix control for targets' self-reported personality traits to show that severity bias exists over and above any potential differences in target personality.

In this study, accuracy is defined as the ability to detect individual differences in personality among targets. This is similar to Chronbach's (1955) definition of differential accuracy, which is defined as the correspondence of the perceiver and criterion ratings with the means removed. It is the degree of correlation between targets' self reported personality and perceivers' impressions of targets' personality. For example, a biased perceiver would rate people with severe FP as having less desirable traits than those with mild FP. A perceiver who is accurate would be able to correctly distinguish between targets with high and low extraversion. It is possible to have both inaccurate and negatively biased judgments or one or the other. Thus, both analyses are needed to get a complete understanding of the way targets are perceived. The bias coefficients calculated in this appendix control for accuracy, and the accuracy coefficients control for bias.

Bias Controlling for Accuracy

We controlled for any possible differences in target traits. Because target personality is a repeated measure, it could not be used as a covariate in an ANCOVA. Instead, we created bias coefficients by calculating partial correlations between the dichotomous variable of FP severity and each perceivers' ratings of each targets' personality, separate for each trait. The control variable was the targets' self-reported personality trait. The correlations were transformed to Fisher's *Zr* to normally distribute scores. Each perceiver had a severity bias coefficient for each of the Big Five traits which represented the degree to which perceivers' personality trait ratings were biased by FP, with larger numbers indicating more bias. For each personality trait, we conducted a one-way

ANOVAs with channel as the independent variable and bias coefficients as the dependent variable. Because FP severity forms part of the bias coefficient, severity bias is tested with the intercept rather than a main effect. The intercept tests the null hypothesis that the grand mean is significantly different from zero. Table A1 shows the ANOVA results of severity bias and channel. Table A2 shows the means, SEs, and planned comparisons examining channel effects on severity bias.

Accuracy Controlling for Bias

Accuracy coefficients were computed for each personality trait by correlating, for each perceiver, their ratings of targets' traits with the targets' self-reported trait ratings. These correlations measure the degree to which the practitioner accurately recognized individual differences in personality between targets. Accuracy coefficients for each practitioner's judgments of targets were transformed to Fisher's *Zr* to normally distribute scores, and then averaged for each practitioner. Each practitioner was given two accuracy coefficients: one for average accuracy for targets with severe FP and one for average accuracy of targets with mild FP. These coefficients indicate the magnitude of practitioners' average accuracy. If the 95% CI of the average accuracy score does not include zero, a perceivers' accuracy is significantly greater than chance. Table A3 shows mean accuracy coefficients, SEs, and 95% CI.

We conducted 5 (channel: face, body, voice+speech, voice+speech+body, all channels) x 2 (severity: severe or mild) ANOVAs with repeated measures on the last factor separate for accuracy coefficients for each trait. See Table A4 for accuracy ANOVA results. Table A5 shows the means and planned comparisons examining channel effects on accuracy.

Results and Discussion

Severity bias effects remained for all personality traits after controlling for target personality. In many cases these effects were quite large. Extraversion remained the trait with the largest severity bias. Controlling for target personality altered the channel integration findings so that extraversion, conscientiousness, and openness show evidence for holism.

Perceivers were relatively accurate in detecting individual differences relative to targets' self reports when judging extraversion, emotional stability, and openness to experience. Perceivers were generally inaccurate in judging agreeableness and conscientiousness. Most traits showed main effects of channel indicating that perceivers who had access to more expressive channels were more accurate.

The accuracy findings involving FP severity did not show a consistent, interpretable pattern. Extraversion was the only trait that showed the predicted main effect that severe targets were judged less accurately than mild targets, but in the case of conscientiousness and emotional stability, the opposite was found.

Table A1

Bias ANOVA Results for Each Personality Trait

Trait	Source	*F*	η_p^2
Extraversion	Severity bias	376.10	0.79
	Channel	13.26	0.35
Agreeableness	Severity bias	13.18	0.12
	Channel	8.68	0.26
Conscientiousness	Severity bias	279.24	0.74
	Channel	6.93	0.22
Emotional Stability	Severity bias	31.89	0.25
	Channel	9.53	0.28
Openness	Severity bias	135.46	0.58
	Channel	12.09	0.33

Note. DF error is 97. All *p*'s < .001.

Table A2

Descriptive Statistics and Planned Comparisons Examining Channel Effects on Severity Bias

				Pairwise comparison with face		
Trait	Channel	*M*	*SE*	*F* (1,97)	*p*	η_p^2
Extraversion	Face	0.54	0.04			
	Body	0.14	0.04	48.19	0.00	0.33
	Voice+speech	0.31	0.04	20.42	0.00	0.17
	Voice+speech+body	0.32	0.04	17.03	0.00	0.15
	All channels	0.42	0.04	4.79	0.03	0.05
Agreeableness	Face	0.32	0.06			
	Body	-0.10	0.06	25.16	0.00	0.21
	Voice+speech	0.05	0.05	12.92	0.00	0.12
	Voice+speech+body	-0.02	0.06	18.59	0.00	0.16
	All channels	0.22	0.06	1.58	0.21	0.02
Conscientiousness	Face	0.50	0.04			
	Body	0.18	0.05	26.39	0.00	0.21
	Voice+speech	0.32	0.04	10.48	0.00	0.10
	Voice+speech+body	0.30	0.04	11.63	0.00	0.11
	All channels	0.33	0.05	7.22	0.01	0.07
Emotional Stability	Face	0.30	0.05			
	Body	-0.10	0.05	29.81	0.00	0.24
	Voice+speech	0.06	0.04	13.24	0.00	0.12
	Voice+speech+body	0.12	0.05	7.01	0.01	0.07
	All channels	0.26	0.05	0.30	0.59	0.00
Openness	Face	0.50	0.05			
	Body	0.05	0.05	44.27	0.00	0.31
	Voice+speech	0.20	0.04	24.06	0.00	0.20
	Voice+speech+body	0.22	0.04	19.34	0.00	0.17
	All channels	0.24	0.05	14.25	0.00	0.13

Table A3

Perceivers' Zr Accuracy Scores for Big Five Personality Traits

		Extraversion				Agreeableness				Conscientiousness			
				95% CI				95% CI				95% CI	
Condition	Severity	M	SE	Lower	Upper	M	SE	Lower	Upper	M	SE	Lower	Upper
Face	Severe	**0.13**	0.07	-0.01	0.28	0.01	0.08	-0.15	0.16	-0.07	0.05	-0.17	0.04
	Mild	**0.26**	0.05	0.17	0.36	-0.15	0.07	-0.28	-0.02	-0.05	0.05	-0.14	0.04
	All	**0.20**	0.04	0.12	0.28	-0.07	0.05	-0.17	0.03	-0.06	0.03	-0.13	0.01
Body	Severe	0.09	0.08	-0.08	0.25	0.01	0.09	-0.17	0.18	-0.21	0.06	-0.33	-0.09
	Mild	**0.18**	0.05	0.07	0.28	**0.35**	0.07	0.21	0.50	-0.07	0.05	-0.17	0.03
	All	**0.13**	0.05	0.04	0.23	**0.18**	0.06	0.06	0.29	-0.14	0.04	-0.22	-0.06
Voice+speech	Severe	0.10	0.07	-0.04	0.23	0.00	0.07	-0.15	0.14	-0.01	0.05	-0.11	0.09
	Mild	**0.40**	0.04	0.31	0.48	-0.12	0.06	-0.24	0.00	-0.09	0.04	-0.17	0.00
	All	**0.25**	0.04	0.17	0.32	-0.06	0.05	-0.16	0.03	-0.05	0.03	-0.11	0.01
Body+voice+speech	Severe	**0.26**	0.07	0.11	0.40	0.06	0.08	-0.10	0.21	0.06	0.05	-0.04	0.17
	Mild	**0.39**	0.05	0.30	0.48	-0.03	0.06	-0.15	0.10	-0.11	0.04	-0.20	-0.02
	All	**0.32**	0.04	0.24	0.40	0.01	0.05	-0.09	0.12	-0.03	0.03	-0.09	0.04
All channels	Severe	**0.56**	0.08	0.40	0.73	0.03	0.09	-0.15	0.20	**0.18**	0.06	0.06	0.29
	Mild	**0.34**	0.05	0.24	0.45	-0.07	0.07	-0.22	0.07	-0.11	0.05	-0.21	-0.01
	All	**0.45**	0.05	0.36	0.54	-0.02	0.06	-0.14	0.09	0.03	0.04	-0.04	0.11

Note. Bold indicates that the 95% confidence interval does not include zero, indicating that perceivers' accuracy is significantly greater than chance.

Table A3 continued

		Emotional Stability				Openness to Experience			
Condition	Severity	M	SE	95% CI		M	SE	95% CI	
				Lower	Upper			Lower	Upper
Face	Severe	-0.08	0.07	-0.21	0.05	0.11	0.07	-0.02	0.24
	Mild	-0.11	0.07	-0.24	0.03	0.04	0.06	-0.08	0.16
	All	-0.09	0.04	-0.18	-0.01	0.08	0.05	-0.02	0.17
Body	Severe	**0.23**	0.07	0.08	0.37	**0.41**	0.08	0.26	0.56
	Mild	0.06	0.08	-0.09	0.21	0.13	0.07	0.00	0.27
	All	**0.15**	0.05	0.05	0.24	**0.27**	0.05	0.17	0.38
Voice+speech	Severe	**0.20**	0.06	0.08	0.32	0.02	0.06	-0.10	0.14
	Mild	**0.20**	0.06	0.08	0.33	**0.41**	0.05	0.30	0.51
	All	**0.20**	0.04	0.12	0.28	**0.21**	0.04	0.13	0.30
Body+voice+speech	Severe	**0.40**	0.06	0.28	0.53	**0.32**	0.06	0.19	0.45
	Mild	0.08	0.07	-0.05	0.21	**0.28**	0.06	0.16	0.39
	All	**0.24**	0.04	0.16	0.33	**0.30**	0.05	0.21	0.39
All channels	Severe	**0.33**	0.07	0.18	0.47	**0.44**	0.07	0.29	0.58
	Mild	**0.19**	0.08	0.04	0.34	**0.21**	0.07	0.08	0.34
	All	**0.26**	0.05	0.16	0.35	**0.32**	0.05	0.22	0.43

Table A4

Accuracy ANOVA Results for Each Personality Trait

Trait	Source	*F*	*p*	η_p^2
Extraversion	Severity	4.09	0.05	0.04
	Severity * channel	3.88	0.01	0.14
	channel	7.19	0.00	0.23
Agreeable	Severity	0.21	0.65	0.00
	Severity * channel	3.45	0.01	0.12
	channel	3.32	0.01	0.12
Emotional Stability	Severity	7.58	0.01	0.07
	Severity * channel	1.74	0.15	0.07
	channel	11.07	0.00	0.31
Conscientiousness	Severity	5.33	0.02	0.05
	Severity * channel	4.79	0.00	0.16
	channel	2.59	0.04	0.10
Openness	Severity	1.45	0.23	0.02
	Severity * channel	10.53	0.00	0.31
	channel	4.18	0.00	0.15

Note. DF error is 97.

Table A5

Descriptive Statistics and Planned Comparisons Examining Channel Effects on Accuracy

				Pairwise comparison with face		
Trait	Channel	*M*	*SE*	*F*	*p*	η_p^2
Extraversion	Face	0.20	0.04			
	Body	0.13	0.05	1.12	0.29	0.01
	Voice+speech	0.25	0.04	0.77	0.38	0.01
	Voice+speech+body	0.32	0.04	4.48	0.04	0.04
	All channels	0.45	0.05	16.19	0.00	0.14
Agreeableness	Face	-0.07	0.05			
	Body	0.18	0.06	10.16	0.00	0.09
	Voice+speech	-0.06	0.05	0.01	0.92	0.00
	Voice+speech+body	0.01	0.05	1.35	0.25	0.01
	All channels	-0.02	0.06	0.38	0.54	0.00
Emotional stability	Face	-0.09	0.04			
	Body	0.15	0.05	13.97	0.00	0.13
	Voice+speech	0.20	0.04	25.82	0.00	0.21
	Voice+speech+body	0.24	0.04	31.69	0.00	0.25
	All channels	0.26	0.05	30.23	0.00	0.24
Conscientiousness	Face	-0.06	0.03			
	Body	-0.14	0.04	2.38	0.13	0.02
	Voice+speech	-0.05	0.03	0.04	0.85	0.00
	Voice+speech+body	-0.03	0.03	0.45	0.51	0.00
	All channels	0.03	0.04	3.06	0.08	0.03
Openness	Face	0.08	0.05			
	Body	0.27	0.05	7.54	0.01	0.07
	Voice+speech	0.21	0.04	4.56	0.03	0.04
	Voice+speech+body	0.30	0.05	11.49	0.00	0.11
	All channels	0.32	0.05	12.26	0.00	0.11

Note. DF error is 97.

Appendix B: Education Text for Training Study

In everyday life, when we meet new people, we form first impressions of their personalities very quickly. Without even thinking about it, we often rely heavily on *nonverbal behaviors* when forming impressions about the emotions someone is feeling. We especially rely on how people's faces change in response to what's happening during a conversation. We pay attention to whether people do things like smiling, frowning, and raising or furrowing their eyebrows.

Generally, this works well. The problem comes when we meet someone who cannot move his or her face normally, like someone with facial paralysis. Some people are born with facial paralysis, and others acquire facial paralysis from conditions such as Bell's palsy, stroke, or nerve damage. Facial paralysis ranges in severity—some people have only slight paralysis on one or both sides of their faces, and others' faces are completely paralyzed.

People with facial paralysis may experience:

- No facial expressions
- Asymmetrical facial expressions
- Speech difficulty due to paralyzed lips
- Inability to blink or difficulty blinking
- Sagging skin due to low muscle tone.

The perspective of a person with facial paralysis:

"Try as I might, I can't move my face to reflect my state of mind. I often appear unfriendly on the outside while actually smiling on the inside."

People with facial paralysis compensate for their lack of facial expression by expressing themselves with their body language, posture, gestures, tone of voice, and their words, rather than with their faces.

So when trying to form impressions about their personalities, PAY ATTENTION TO their body language, gestures, tone of voice, and their words. Pay LITTLE OR NO attention to their faces or the extent to which their faces are expressionless, asymmetrical, or saggy, because these are simply symptoms of facial paralysis.

Appendix C: Separating Bias and Accuracy for the Training Study

This appendix describes analyses of the training study that were presented in the main text, breaking the raw extraversion scores into two component parts: bias controlling for targets' self-reported traits and accuracy. These analyses were conducted because of the potential differences in targets' self-reported traits and follow the same approach as the analyses in Appendix A.

Bias Controlling for Accuracy

Bias coefficients controlling for targets' self-reported extraversion were calculated the same way as described in Appendix A. Table C1 shows the bias coefficient descriptive statistics for the training study. We conducted a one-way ANOVA with training condition as the independent variable and bias coefficients as the dependent variable. Table C2 shows the effects of severity bias and channel.

Accuracy Controlling for Bias

Extraversion accuracy coefficients were computed in the same way as in Appendix A. Table C3 shows the accuracy coefficient descriptive statistics and CIs. We conducted a 3 (training condition: education, education+feedback, control) x 2 (severity) ANOVA on extraversion accuracy coefficients, with repeated measures on the last factor. See Table C4 for accuracy ANOVA results.

Results and Discussion

A strong effect of severity bias remained, even when controlling for target extraversion. This replicates the findings in Study 3 and Appendix A. Because FP severity is part of the bias coefficients, there is no test for the effect of condition.

This is acceptable because there is no reason to expect that controlling for targets' extraversion, a within-subjects factor, would differentially affect perceivers' ratings across training conditions, a between subjects factor. Rather, the nonsignificant main effect of condition indicates that there are no differences in severity bias between training conditions.

There was no effect of training condition on perceivers' extraversion accuracy. There was a main effect of severity, indicating that perceivers were less accurate when rating severe targets than when rating mild targets, replicating the accuracy findings in Appendix A. There was no interaction of severity by condition on accuracy, indicating that training condition did not moderate the effect of severity on accuracy.

Table C1

Severity Bias Descriptive Statistics for Each Training Condition

Training Condition	*M*	*SE*
Control	0.31	0.04
Education	0.29	0.04
Education+feedback	0.36	0.04

Table C2

Bias ANOVA Effects of Severity Bias and Channel

Source	F	*p*	η_p^2
Severity	215.58	0.00	0.68
Training condition main effect	0.85	0.43	0.02

Note. DF error is 107.

Table C3

Perceivers' Zr Accuracy Scores for Extraversion

				95% CI	
Condition	Severity	M	SE	Lower	Upper
Control	Severe FP	0.30	0.04	0.22	0.38
	Mild FP	0.44	0.04	0.37	0.52
Education	Severe FP	0.32	0.04	0.24	0.39
	Mild FP	0.40	0.04	0.33	0.47
Education+feedback	Severe FP	0.32	0.04	0.24	0.40
	Mild FP	0.39	0.04	0.32	0.46

Table C4

Accuracy ANOVA effects of Severity and Training Condition

Source	*F*	*p*	η_p^2
Severity	8.74	0.00	0.08
Training condition	0.12	0.89	0.00
Severity x training condition	0.53	0.59	0.01

Note. DF error is 107.

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