

# Thin-Slice Judgments in the Clinical Context

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## Abstract

Clinicians make a variety of assessments about their clients, from judging personality traits to making diagnoses, and a variety of methods are available to do so, ranging from observations to structured interviews. A large body of work demonstrates that from a brief glimpse of another's nonverbal behavior, a variety of traits and inner states can be accurately perceived. Additionally, from these "thin slices" of behavior, even future outcomes can be predicted with some accuracy. Certain clinical disorders such as Parkinson's disease and facial paralysis disrupt nonverbal behavior and may impair clinicians' ability to make accurate judgments. In certain contexts, personality disorders, anxiety, depression, and suicide attempts and outcomes can be detected from others' nonverbal behavior. Additionally, thin slices can predict psychological adjustment to divorce, bereavement, sexual abuse, and well-being throughout life. Thus, for certain traits and disorders, judgments from a thin slice could provide a complementary tool for the clinician's toolbox.

## Contents

INTRODUCTION.....	132
THIN-SLICE METHODOLOGY.....	133
CLINICIANS' NONVERBAL BEHAVIOR.....	134
Clinician Gender Differences.....	135
Clinician Cultural Differences.....	135
PATIENTS' NONVERBAL BEHAVIOR.....	136
ACCURATELY PERCEIVING CLINICALLY RELEVANT	
TRAITS AND DISORDERS FROM THIN SLICES.....	136
Personality Disorders.....	137
Anxiety.....	138
Depression.....	139
Suicide.....	140
IMPRESSIONS OF PEOPLE WITH EXPRESSIVE DISORDERS.....	141
Thin-Slice Impressions by People with Expressive Disorders.....	143
Thin Slicing Clinically Relevant Traits.....	144
THIN SLICES PREDICTING OUTCOMES.....	144
Clinician and Patient Outcomes.....	144
Well-Being and Longevity.....	145
Predicting Clinical Outcomes.....	146
THIN SLICING ON THE INTERNET.....	146
CONCLUSION.....	147

## INTRODUCTION

In a well-known case study of a suicidal patient, Paul Ekman (1985) describes an interview with “Mary.” During an interview, Mary claimed that she was feeling well and asked for a weekend pass to leave the clinic. From a video recording of this interview, many psychiatrists believed that the patient was indeed recovering as she claimed. Yet, before she received her pass, Mary confessed that she had lied in order to receive the opportunity to leave the clinic. She still wanted to commit suicide. In reviewing a video recording of the interview, Ekman & Friesen (1969) discovered a brief, but informative microexpression. “In a moment’s pause before replying to her doctor’s question about her plans for the future, we saw in slow-motion a fleeting facial expression of despair” (Ekman 1985, p. 17). Perhaps this facial expression revealed Mary’s true intentions. Possibly, by reviewing Mary’s nonverbal behavior, clinicians could have predicted a relapse—in the event she herself did not admit her intention to commit suicide. The current article reviews a body of research that suggests that, in certain contexts, from merely observing “thin slices” of nonverbal behavior, individuals’ clinically relevant traits and outcomes can indeed be accurately predicted. In this review, we first describe thin-slice methodology. Next, we review the role of clinician nonverbal behavior in clinical interactions and discuss patients’ nonverbal behavior. We then present evidence for accurate perceptions of clinically relevant traits and disorders from thin slices. Finally, we discuss the ability of thin slices to predict clinical outcomes, and we describe new media and channels for expressing nonverbal behavior.

## THIN-SLICE METHODOLOGY

A thin slice is a random sample of the behavioral stream that is less than five minutes long (often merely seconds long; Ambady et al. 2000, Ambady & Rosenthal 1992). In studies utilizing thin slices, naïve judges rate targets who have been recorded in some way. The judges (the participants who are observing the thin slices) are typically unacquainted with the targets (the people who have been recorded and will be judged). Targets can be recorded across a variety of channels, including video, audio, and transcripts. A full-video clip displays many channels. These refer to video clips that feature targets (whether just their face, or body, or both) but also include audio. Silent video clips are video clips that mute the audio from targets.

Audio clips also come in different varieties. Full-audio clips are unaltered audio recordings that feature both what a target is saying and how the target is saying it. This can be contrasted with content-filtered audio clips. Content filtering removes specific audio frequencies associated with word recognition, which leaves vocal tone audible but actual speech content unintelligible. Conversely, some studies examine transcripts from targets' speech; these transcripts remove vocal tone but retain the targets' speech content.

The original definition of thin slices (Ambady et al. 2000, Ambady & Rosenthal 1992) as samples of the behavioral stream containing dynamic information (recordings of behavior over time) has been broadened to include photographs as instances of thin slices as well. Static photographs can be conceived of as containing dynamic information. For example, although smiling happens across time, the configuration of muscles that make up a smile between its onset and offset, recorded in a photograph, can capture information diagnostic to differing levels of positive affect. Duchenne smiles, those expressed during genuine happiness, are those that include muscular activations around the eye, forming "crow's feet," in addition to raising the corners of the mouth, whereas non-Duchenne smiles do not activate muscles around the eye and can be displayed for a variety of reasons other than positive affect (e.g., politeness; Ekman 1992). Thus, a photograph of a person smiling, for instance, can contain information from the dynamic behavioral stream that conveys a person's happiness.

In addition to capturing a critical expressive moment of a dynamic behavior, photographs can leave cues to prior behavior. For example, the cumulative effects of healthy and unhealthy behaviors can yield healthier and unhealthier looking skin, respectively, giving visual cues to identify social groups that have healthier lifestyles (Rule et al. 2010). Additionally, tensing facial muscles over time can influence facial development (e.g., jaw development) with influences on facial appearance (Kreiborg et al. 1978). People who often express anger, for example, over time can appear to look angry even when displaying a neutral facial expression (Malatesta et al. 1987; see also Zajonc et al. 1987). Thus, certain behaviors or psychological states can, both over time and in the moment, be etched into the face. Therefore we now include photographs as examples of thin slices.

From these thin slices (including any of the channels of behavior discussed above; e.g., video, audio, photographs, transcripts), naïve judges rate targets, and accuracy is measured in a variety of ways. Judges' ratings can be compared to targets' own self-reports about internal states or personal traits, acquainted peers' ratings of the targets, or actual known outcomes. For example, naïve judges could rate targets who have recently married on how satisfied or happy the targets are, and ratings could be compared to targets' levels of self-reported marital satisfaction, friends' ratings of the couple's satisfaction, the couple's self-reported marital satisfaction at a later point, and actual longevity of the marriage (e.g., does the couple ultimately get divorced, and if so, when?). The current article reviews studies that record targets across a variety of channels and measures naïve judges' ability to accurately perceive clinically relevant traits and outcomes from thin slices of those recordings.

## CLINICIANS' NONVERBAL BEHAVIOR

Over the past 30 years, health care has shifted from a medical model to a biopsychosocial model. Concurrently, the view that medicine is a technical practice of the clinician has shifted to the view that medicine should be a dynamic interaction with the patient involving psychological and social information (Engel 1977). Out of this shift has emerged a large amount of research on the importance of nonverbal and verbal behavior in health care interactions. For instance, clinicians' nonverbal behavior has been found to influence clinician-patient rapport and patients' adherence to medical regimens (DiMatteo 1979, Hall et al. 1995).

Many studies have examined the provider behaviors associated with patient liking and satisfaction, as these factors have been associated with patient retention and adherence (Gauchet et al. 2007). Generally, practitioners who are more interpersonally sensitive and emotionally expressive and whose nonverbal cues indicate attentiveness toward the patient (looking less at the chart and more at the patient, leaning forward) receive more positive ratings from patients (e.g., Bensing 1991, DiMatteo & Hays 1980). Such behaviors, including reassurance, attentiveness, and emotional support, can lead to better patient outcomes (DiMatteo 1979, Egbert et al. 1964).

Given the wealth of information that doctors can glean from patients, researchers have also been interested in health care practitioners' nonverbal sensitivity, that is, their ability to attend to patients' nonverbal behavior and understand a patient's feelings and thoughts. Indeed, physicians' nonverbal sensitivity is associated with patient satisfaction (DiMatteo et al. 1979). As part of their training, medical students take part in role-playing interactions, called objective structured clinical examinations, with mock patients, called standardized patients. These interactions are often video recorded for evaluation purposes, making them an ideal source for examining the role of nonverbal behavior in clinical interactions. Hall et al. (2009a) examined the influence of medical students' nonverbal sensitivity on standardized patients' behaviors. Standardized patients behaved in a less distressed, more empowered, and more engaged manner when being interviewed by students who had greater nonverbal sensitivity. Standardized patients liked highly nonverbally sensitive medical students more and rated them as more compassionate compared to students with less nonverbal sensitivity.

Rapport, a dynamic process theorized to include mutual attentiveness, positivity, and coordination, is widely recognized as important to the health care relationship (Tickle-Degnen & Rosenthal 1990). The ability to build rapport in a health care relationship has been hypothesized to increase patient liking, trust, and adherence. In a study using the objective structured clinical examination, trained coders viewed video recordings of medical students and standardized patients and rated their rapport (Hall et al. 2009b). Dyads were rated as having higher rapport when medical students provided more positive statements, less medical information, and when medical students appeared more respectful and warm and less anxious and dominant. Moreover, the more medical students were sensitive to their patients' nonverbal behavior, the more rapport they achieved as rated by the trained judges.

At the extreme end, patient dissatisfaction and poor communication may result in malpractice lawsuits (Hickson et al. 1994). Ambady and colleagues (2002b) found differences between the vocal behavior of physicians who had been sued for malpractice two or more times and physicians who had never been sued: Doctors whose vocal tone was rated as showing higher dominance and lower concern for or about the patient were more likely to have been sued for malpractice. Because malpractice lawsuits contribute to high health care costs and are a great source of anxiety and hardship for both the patient and the doctor, future studies should examine whether training in communication can improve quality of communication and adherence and change the likelihood of dissatisfied patients suing for malpractice.

## Clinician Gender Differences

Only a few studies have examined gender differences among practitioners and patients in nonverbal behavior during health care interactions. Given that sensitivity to patients' nonverbal behavior enhances rapport, and that, on average, women tend to be more nonverbally sensitive than men, including among medical students (Hall et al. 2009a) and clinicians (Roter et al. 2002), female clinicians might tend to have more rapport with their patients. In a study of video-recorded doctors' visits, Hall and colleagues (1994) found that female clinicians exhibited warmer, more communicative behavior. They conducted longer visits, made more positive statements, asked more questions, and smiled and nodded more. Interestingly, male and female practitioners did not differ in their amount of social conversation, technical language, and emotional support. Focusing on female-female clinician-patient interactions revealed a generally additive pattern, in which female doctors and patients had the longest appointments, the most equal speaking ratio, and displayed more of these warm, communicative behaviors than were found in any other gender combination. However, when female doctors interacted with male patients, a puzzling set of behaviors emerged: Doctors used less technical language, smiled frequently, and used vocal tone that was dominant in the beginning and less friendly late in the visit. This pattern of behavior may reflect female doctors' responses to role strain. The use of smiling may be interpreted as an effort to appease the patient, and their use of simpler medical language may have been an effort to downplay the traditionally nonnormative gender power differential. Although differences in patient outcomes as a function of patient and practitioner gender still need to be systematically examined, behaviors like those displayed by female practitioners and patients have been linked to improvements in physical health, pain, adherence, and comprehension of information (Stewart 1995).

## Clinician Cultural Differences

Very little research has examined cross-cultural differences in health care interactions. Van den Brink-Muinen and colleagues (2003) examined verbal and nonverbal communication in health care visits in six European countries (The Netherlands, Spain, the United Kingdom, Belgium, Germany, and Switzerland). Consultations were shortest in Germany and Spain and longest in Switzerland and Belgium. Belgians had the most information exchange, the health care visits in The Netherlands and Spain were focused more on instrumental and biomedical information, communication was more affective and biomedical in Germany, and British and Swiss communication was more affective and psychosocial. The health care communication literature has been generally focused on American culture. Within this culture, affective and psychosocial communication styles are generally associated with positive health outcomes (Stewart 1995). Future research should examine the outcomes associated with these communication styles in their various cultures, as this is likely to vary.

A rare exception to the focus on Western cultures with Western practitioners and patients is Ishikawa and colleagues' (2006) study of objective structured clinical examinations in Japan. In contrast to the often-reported role of positive facial expression in Western studies, in Japan, medical students' facial expressions were not associated with positive ratings by standardized patients. Rather, medical student behaviors associated with positive ratings from standardized patients included facing the patient, nodding frequently, matching the patient's vocal speed and tone, and spending equal amounts of time looking at the patient whether talking or listening. Relative to Western culture, display rules in Asian cultures dictate that expressiveness is less socially acceptable overall (Matsumoto 1990). Thus, it is not surprising that facial expressivity is not valued in the Japanese health care context. However, behaviors associated with attending

to the patient, such as facing the patient and interpersonal coordination, which are frequently associated with patient satisfaction in Western culture (e.g., Ambady et al. 2002a), appear to improve patient satisfaction in Japan as well. This suggests that, perhaps, an American doctor's positive expression would be less valued by a Japanese patient than an American patient. With increased globalization, health-care interactions in which the doctor and patient may be from different cultures are becoming increasingly common; this is an area ripe for future study.

## **PATIENTS' NONVERBAL BEHAVIOR**

Doctors frequently base diagnosis and treatment decisions on thin slices of patients' nonverbal behavior. For example, severity of pain is commonly assessed through a combination of measures, including clinical judgments of pain facial expressions, vocalizations, and pain behaviors (awkward postures, limping), in addition to patient self-report (Turk et al. 1985). Indeed, research suggests that pain can be readily detected from facial expressions. Prkachin (1992) found that naïve observers could accurately detect real pain from faked pain in facial expressions. However, Poole & Craig (1992) found that participants who were in pain and were asked to exaggerate their pain expressions fooled raters into thinking they were in more pain than they actually were. Participants in this study were also asked to try to hide their pain, but judges could still detect it. Coronary artery disease has also been linked to distinctive vocal and facial expressions. Rosenberg and colleagues (2001) interviewed patients with coronary artery disease while assessing them for ischemia. Patients with ischemia showed significantly more anger expressions and false smiles than did patients without ischemia (see also Chesney et al. 1990). More generally, nonverbal behavior is a rich source of information that can provide perceivers with cues to form accurate impressions. Even just a thin slice of the behavior stream can provide surprisingly diagnostic information. We next describe evidence that thin slices can provide diagnostic cues for accurately perceiving clinically relevant traits and disorders.

## **ACCURATELY PERCEIVING CLINICALLY RELEVANT TRAITS AND DISORDERS FROM THIN SLICES**

Clinicians make a variety of assessments about their clients, from judging their clients' personality traits to making diagnoses, and a variety of methods are available to do so, ranging from observations to structured interviews (Garb 2005). Inventories, checklists, and guidelines are among the instruments that are at clinicians' disposal to make these decisions, but how much information should be collected before arriving at a decision? As described above, sometimes a thin slice of behavior can provide a wealth of information, including information that clients may not volunteer (as in the opening example about Mary). Thus, for certain traits and disorders, judgments from a thin slice could provide a complementary tool for the clinician's toolbox. The current section reviews a range of evidence demonstrating the contexts in which perceivers can accurately identify clinically relevant traits and outcomes from thin slices of behavior. By accuracy, here and throughout this review, we mean ratings that better than chance predict some criterion. Of course very high accuracy will have great clinical utility, whereas accuracy that is only slightly above chance may have little clinical utility. Yet even cues with lesser utility on their own may prove useful when combined with other diagnostic tools. Additionally, the demonstration of better-than-chance accuracy for a particular cue could lead future research to uncover more diagnostic cues with even greater clinical utility.

## Personality Disorders

Personality disorders consist of enduring patterns of behavior associated with distress and disability. Perceivers viewing short silent videos of healthy control populations can accurately identify personality traits including extraversion, conscientiousness, neuroticism, confidence, interpersonal warmth, intelligence, self-esteem, life satisfaction, sociosexuality, and sexual orientation (Albright et al. 1988; Ambady et al. 1999; Borkenau & Liebler 1992, 1993; Rule et al. 2011; Slepian et al. 2013; Yeagley et al. 2007). Given that personality disorders have been considered to be maladaptive variants of personality traits (Widiger & Mullins-Sweatt 2009), which can be accurately perceived from nonverbal behavior, personality disorders might also be accurately perceived from thin slices, and indeed, a number of studies have demonstrated accurate perceptions of personality disorders.

One study examined perceptions of personality traits in a population in which one-third of individuals met the criteria for a personality disorder (Oltmanns et al. 2004). Replicating prior work, personality traits were indeed perceptible from thin slices, with certain traits such as extraversion being the most visible. Additionally, ratings from 30-second video clips predicted ratings made on the Structured Interview for DSM-IV Personality. Participants could accurately perceive traits characteristic of schizoid and avoidant personality disorders (low extraversion), histrionic personality disorder (high extraversion), borderline personality disorder (high neuroticism), obsessive-compulsive personality disorder (high conscientiousness), and antisocial personality disorder (low conscientiousness).

A second study (Friedman et al. 2006) replicated these results and examined the channels that contributed to accuracy. Merely reading transcripts of targets' speech did not lead to accuracy, demonstrating that the content of individuals' speech was not the valid cue to personality disorders. Rather, audio from interviews and (silent) nonverbal behavior were the most reliable channels, with nonverbal behavior being particularly informative. Impressively, in this and the study described above, all targets were military recruits wearing a standard military uniform and bearing similar short haircuts. Thus, these results occur even when potentially diagnostic cues such as clothing and hairstyle are controlled for.

In yet another follow-up study (Friedman et al. 2007), traits specifically diagnostic to personality disorders were rated from 30-second video clips. Targets were rated on indicators of personality disorders, such as "prefers to do things alone" and "has no close friends" for schizoid personality disorder; "worries that other people will criticize or reject him or her" and "thinks he/she is clumsy, unattractive, or inferior to other people" for avoidant personality disorder; "is unhappy when he/she is not the center of attention" and "uses physical appearance to draw attention to him/herself" for histrionic personality disorder; and "is stuck up or high and mighty" and "takes advantage of other people" for narcissistic personality disorder. And, indeed, thin slices accurately predicted personality disorders. Sometimes, however, there was little specificity between personality disorders, such as between schizoid and avoidant personality disorders, and also between histrionic and narcissistic personality disorders. This could be due to a lack of specificity in accurate perceptions or to co-occurrences of diagnostic categories across personality disorders. Broadly, these studies demonstrate that pathological personality traits can be perceived in thin slices. Across these studies, accuracy was found whether judges rated specific personality traits that vary with personality disorders or rated specific pathological traits, and whether naïve judges' ratings were compared with ratings of targets' peers or targets' own self-reports from structured interviews.

Another personality disorder that has received recent attention within thin-slice work is psychopathy, which is characterized by interpersonal and affective predispositions toward antisocial behavior. Fowler et al. (2009) showed naïve judges videos of prison inmates, who had a range of psychopathic traits. Thin-slice ratings of the degree to which targets matched short descriptions of

psychopathy from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; Am. Psychiatr. Assoc. 2000) accurately predicted actual criterion measures of psychopathy (Fowler et al. 2009). Both overall psychopathy and the two individual factors of psychopathy (affective/interpersonal and antisocial/criminal lifestyle) were predicted by thin-slice judgments. Moreover, the shorter the videos, the greater the accuracy. Ratings from 5-second clips were more accurate than those made from 10- and 20-second clips.

Individuals with psychopathy are generally seen to be charming and intelligent, and indeed judges perceived more intelligent targets to also be more psychopathic. Likewise, targets rated as attractive also were more likely to be perceived as psychopathic. Interestingly, thin-slice ratings of intelligence and attractiveness did not predict actual criterion measures of psychopathy, suggesting that although perceivers can accurately perceive psychopathy, increased psychopathy is not as related to perceived intelligence and attractiveness as participants believe them to be. In this case, in contrast to typical findings (see Ambady et al. 2000, Ambady & Rosenthal 1992), verbal behavior was more informative than nonverbal behavior. Perhaps verbal behavior provides important cues to criminality and proneness to violence, cues related to accurate perceptions of psychopathy. The discovery of the actual diagnostic cues to psychopathy awaits future research.

Although verbal behaviors seem to provide useful information in accurately perceiving psychopathy, nonverbal cues can also reveal psychopathic traits. For instance, one recent study demonstrates that psychopathy can be accurately perceived from faces alone. Using a face-averaging technique, a subgroup of targets who scored highly on psychopathy were photographed, and the photos of their faces were combined into a single composite face (Holtzman 2011). Drawing from the same group of targets, photographs were taken of those lowest in psychopathy, and those faces were also entered into the face-averaging software to create a composite face. Composite faces were also created for targets highest and lowest in narcissism and Machiavellianism. The composite faces were then shown to another group of perceivers, and perceivers could accurately guess whether those composite faces were made up of people high (versus low) in psychopathy, narcissism, and Machiavellianism. Narcissism also can be accurately judged from full-body photographs (Vazire et al. 2008). In summary, some traits specifically diagnostic to personality disorders and some specific personality disorders can be accurately perceived from thin slices.

## Anxiety

A recent meta-analysis examined the detection of state and trait anxiety, comparing thin-slice audio (verbal and vocal) to thin-slice visual cues (Harrigan et al. 2004). First, the meta-analysis demonstrated that trait anxiety is, across studies, visible from thin slices. In an early study, for example, psychiatric patients were video recorded when undergoing a clinical interview (Waxer 1977). From watching one-minute silent video clips, naïve judges were able to accurately judge trait anxiety. In another study, participants who varied on trait anxiety were video recorded while discussing a variety of events (Harrigan et al. 1996). A thirty-second silent video segment was extracted from each video, and naïve judges rated the anxiety level of each target. Naïve judges could accurately discriminate between high- and low-level trait anxiety targets, but only from silent video clips, not audio clips. In that study, trait anxiety was more detectable from visible nonverbal behavior than audio (and speech). Not much work has been done to identify nonverbal cues to trait anxiety, but one cue might be increased gaze aversion (Gilbert 1991, Wiens et al. 1980).

The meta-analysis also demonstrated that, across studies, state anxiety can be perceived from thin slices. For instance, in one study, dentists could accurately detect distress, pain, and anxiety from their patients (Baron et al. 1990). In another study, naïve judges observed high- and low-state-anxious individuals describing personal experiences (either an anxious or happy event;

Harrigan et al. 1992). From both full-video and silent nonverbal clips, perceivers could accurately detect levels of state anxiety. In a follow-up study specifically on nonrepressor participants (i.e., those who do not repress state anxiety), a different pattern of results emerged (Harrigan et al. 1994). Unlike in the study just described, which included repressors and nonrepressors, state anxiety could not be detected in silent video clips; only when audio was added to the nonverbal videos could state anxiety be accurately detected. If anything, the silent nonverbal clips seemed to present misleading information (Harrigan et al. 1994). Perhaps state anxiety is normally more often expressed in the audio channel, and when individuals attempt to repress this anxiety they successfully do so in the audio channel, but then their anxiety leaks into other nonverbal channels. Future research could test this possibility.

Interestingly, the meta-analysis (Harrigan et al. 2004) also demonstrated that channel informativeness varies systematically across state and trait anxiety. Whereas trait anxiety is more reliably detected from video clips, state anxiety is more reliably detected from audio clips. In one study on state and trait anxiety, healthy control participants were compared to patients with panic disorder, social phobia, and major depressive disorder (McNally et al. 2001). All participants described their most frightening experience (designed to elicit state anxiety) as well as a neutral emotional experience. Subsequently, judges listened to audio recordings that were content filtered. Fear memories were rated as more anxious sounding than neutral memories, but there were no differences across groups in either the neutral or fear memory conditions. Thus, whereas trait anxiety can be accurately perceived in visual nonverbal thin slices, it is not as readily heard in audio clips, unlike state anxiety. One audio cue to state anxiety might be increased voice pitch and jitter (Fuller et al. 1992, Laukka et al. 2008); however, trait anxiety does not appear to be related to stable differences in such acoustic measures (also see Hagenars & van Minnen 2005). Although some audio cues to state anxiety have been found, more work needs to be done on this subject. Additionally, very little work has systematically examined the visual nonverbal cues to trait anxiety, and thus this an area ripe for future research.

## Depression

Depression can also be accurately detected in thin slices. In an early study, patients were video recorded when undergoing an admission interview, and half of these targets were later admitted for depression (Waxer 1974). Naïve and expert judges watched two-minute silent video clips of targets and guessed whether targets had depression. Participants as a whole guessed who had depression better than chance, and experts did slightly better than nonexperts. This early study noted some nonverbal cues that differed between the two groups, albeit with a small target sample size. One of the largest differences was level of eye contact. Depressed and nondepressed patients looked at the interviewer for an equal amount of time, but depressed patients maintained eye contact less. A follow-up study (Waxer 1976) replicated these results and also demonstrated differences in the orientation of the head, mouth, and hands. Depressed patients displayed more contraction of lower corners of their mouth (associated with negative emotion), looked downward more, and moved their hands less. Additionally, continuous judgments of the severity of depression predicted scores on the Minnesota Multiphasic Personality Inventory depression scale (see also Hinchliffe et al. 1970). Another study comparing participants who had recovered from depression to those who were still depressed found that those who were still depressed maintained less mutual eye gaze (Hinchliffe et al. 1971).

Vocal qualities can also distinguish those with depression. For example, positive responses to depression treatment led to fewer pauses when speaking, greater pitch variability, and faster speech rates (Mundt et al. 2007, 2012). In a study that recorded audio from interviews with depressed

patients, naïve judges rated target depression severity from content-filtered speech extracted from the first three questions of the interview (Yang et al. 2013). These ratings predicted actual target depression severity. In that study, only participants on the high and low end of depression were selected as targets from a larger pool. Would judges be able to detect depression from the full continuum of depression severity? One study (Mehl 2006) suggests that perhaps only moderate to severe depression can be accurately perceived from thin slices of the behavior stream. Using a naturalistic observation method, a nonclinical sample of 96 participants was tracked with a digital voice recorder that recorded approximately five 30-second samples of ambient sounds per every waking hour across two days. These recordings picked up any sounds around participants, whether the participant was alone, talking to others, or engaging in various activities. Naïve judges listened to these recordings and rated targets' depression. Ratings of depression level did not correlate with criterion measures for depression for nondepressed and mildly depressed participants, but ratings of moderately and severely depressed patients were related to their actual levels of depression. One possibility is that only higher levels of depression can be detected from thin slices. Another possibility is that milder forms of depression are detectable only from thin slices in certain channels. In the Mehl (2006) study, both verbal and vocal elements of sounds were available to judges. Perhaps content filtering the speech would lead to a different pattern of results. Future work could compare ratings from different channels of thin slices across the spectrum of depression severity.

## Suicide

Beyond the case study that was described at the beginning of this review (Ekman & Friesen 1969), a few studies have examined thin-slice ratings as predictors of suicide and suicide attempts. For instance, as coded from videos, reduced upper activity of the face (Heller & Haynal 1997) and increased oral activity (Heller et al. 1997) and asymmetric expressions (Heller & Haynal 1997) were associated with increased risk for suicide reattempts, suggesting perhaps an inhibition to communicate or effort to control mood (Archinard et al. 2000). This work noted some possible nonverbal cues to suicide attempts, but it was based on a rather small sample.

A recent set of studies examined the ability to predict from just a face whether a particular person committed suicide (Kleiman & Rule 2013). This set of studies had the advantage of having an impressively larger sample size of targets. Forty high school and college yearbook photos of individuals who committed suicide were obtained, and the nearest photograph next to each target (matched for sex and race) served as control targets. Participants judged whether these 80 individuals committed suicide or were still alive based on the photographs. As shown by the signal detection statistic  $A'$  (which ranges from 0 to 1, with 0.5 being chance), participants could with some accuracy discriminate between who did and did not commit suicide (e.g., study 1b mean  $A' = 0.55$ ), indicating that participants' (undergraduates, online respondents across the United States, or psychotherapists) guesses were more accurate than chance even when hairstyle and face shape were obscured. Of course, such accuracy is quite low for clinical utility, and further identification of perceptual cues is needed. Indeed, in another study Kleiman & Rule (2013) explored potential different cues. Those who committed suicide and those who did not were not perceived differently in attractiveness, emotional expression, life satisfaction, hopelessness, or depression. Suicide victims' faces were perceived, however, as more impulsive than were those of matched controls. Thus, in a final study, Kleiman & Rule (2013) explored perceptions of impulsivity and found differences in the two groups, in particular in the potential for committing violence in the heat of the moment (rather than impulsivity in domains of monetary spending or sexual acts), with those who had committed suicide being judged as more likely to commit violence

in the heat of the moment. The discovery of which facial cues provide signals to potential violent impulsivity against others or the self awaits future research.

## IMPRESSIONS OF PEOPLE WITH EXPRESSIVE DISORDERS

As we have discussed, thin slices provide a rich source of information and often allow people to form accurate impressions not only about social information such as personality and emotions but also about many clinically relevant traits. However, certain conditions, such as Parkinson's disease and facial paralysis, limit a person's expressivity in various communication channels. The impoverishment of expressive behavior during first impressions can elicit negative and inaccurate impressions from others. Good health care communication involves empathic accuracy, positivity, and rapport, which may be disrupted by disordered expressivity (Tickle-Degnen & Lyons 2004). The most widely studied expressive disorder is Parkinson's disease, which often involves expressive masking symptoms, or reduced spontaneity, fluidity, and intensity of facial, bodily, and vocal expression (Tickle-Degnen & Lyons 2004). In recognition of the importance of clinical impressions of people with Parkinson's disease, the majority of thin-slice studies of this population have involved impressions formed by health care professionals.

In several early studies by Pentland and colleagues (1987, 1988) and Pitcairn and colleagues (1990), rehabilitation professionals (physical, occupational, or speech therapists) or rehabilitation students observed audio recordings or silent 1.5-minute video clips of patients with Parkinson's disease and a control group consisting of heart disease patients, which provided a comparison group with severe chronic disease. Although patients with Parkinson's disease did not differ from patients with heart disease in levels of depression and anxiety, patients with Parkinson's disease were rated by rehabilitation students and professionals as more depressed and anxious. Indeed, overall, they were rated less positively: as more hostile, suspicious, bored, and introverted; as less intelligent and less likeable; and as less able to achieve rapport. Linguistic and acoustic analyses of thin slices of the voice revealed that the patients with Parkinson's disease had more pauses and varied their pitch less, which likely contributed to raters' negative impressions (Pitcairn et al. 1990) because these are also vocal cues to depression (Mundt et al. 2007, 2012).

A notable finding in this literature is that even health care practitioners who are experienced with Parkinson's disease and who understand expressive masking symptoms had levels of bias similar to those of students and lay people (Hemmesch et al. 2009, Tickle-Degnen & Lyons 2004). Even with such explicit knowledge, first impressions about others' interpersonal attributes are often automatically swayed by minimal information (such as facial and vocal expression) because this is usually an effective heuristic strategy (Zebrowitz & Collins 1997). However, in the case of Parkinson's disease or facial paralysis, the face is not a valid cue to the person's social attributes. Even the most well-intentioned health care practitioners may have difficulty overriding this natural human tendency to form social judgments on the basis of facial expression (Tickle-Degnen & Lyons 2004).

A number of studies have shown that practitioners form inaccurate and negatively biased impressions of patients' personalities (relative to patients' self-reports; Lyons et al. 2004, Tickle-Degnen & Lyons 2004, Tickle-Degnen et al. 2011). Compared to rehabilitation professionals, rehabilitation students were particularly likely to rate patients with high levels of masking as less extraverted (Tickle-Degnen & Lyons 2004). Among populations without expressive disorders, extraversion is typically the most accurately judged trait, and it is associated with positive expressivity in the face, body, and voice (Ambady & Rosenthal 1992). Indeed, follow-up studies have demonstrated that practitioners base their impressions of extraversion primarily on the expressive

mask rather than on patient cues that are actually related to their extraversion, such as talkativeness (Lyons et al. 2004).

In one of few cross-cultural thin-slice studies examining perceptions of patients, Tickle-Degnen and colleagues (2011) examined American and Taiwanese health care practitioners' impressions of the social supportiveness, competence, and depressiveness of American and Taiwanese patients with Parkinson's disease. The United States, a highly individualistic culture, places higher importance on sociability, whereas Taiwan, a collectivistic culture, places higher importance on competence and social supportiveness (Markus & Kitayama 1991). Consistent with previous studies, practitioners judged people with facial masking as more depressed and less sociable, less socially supportive, and less cognitively competent. Importantly, practitioners were more biased by masking when judging the sociability of American targets compared to Taiwanese targets, and they were more biased by masking when judging the cognitive competence and social supportiveness of Taiwanese targets compared to American targets. Thus, it appears that practitioners tended to penalize targets for facial masking specifically when rating attributes of high importance within the targets' culture (e.g., sociability in American culture and social supportiveness in Taiwanese culture). In addition, American practitioners' judgments of target sociability were more negatively biased in response to masking than were those of Taiwanese practitioners. Taiwanese practitioners' judgments of target cognitive competence were more negatively biased in response to masking than were those of American practitioners. This indicates that when practitioners were rating attributes that were valued within their own culture, they were also more negatively biased by masking. These findings suggest that differences in the cultural importance of attributes influence practitioners' impressions of people with Parkinson's disease. It is important for practitioners to recognize this potential cultural mismatch. For example, an American occupational therapist working with a Taiwanese patient with Parkinson's disease may incorrectly judge the patient as shy, whereas a Taiwanese physical therapist, or perhaps even the patient's Taiwanese family, may incorrectly judge the patient as being less cognitively competent. This patient could receive inconsistent treatment because the occupational therapist may assume that the person is less interested in pursuing social goals, and the physical therapist may assume that the person is not capable of adhering to complex instructions.

Not only do these studies of Parkinson's disease cause concern for the social lives and health care relationships of people with Parkinson's disease, but they also raise concerns about how Parkinson's disease may affect practitioners' ability to form accurate diagnoses. More than 30 studies have reported high rates of apathy, a proposed symptom or syndrome characterized by a lack of motivation, in people with Parkinson's disease (Bogart 2011). As there are no formalized criteria for apathy, it is difficult to assess the validity of these studies. At least six measures have been used to assess apathy in Parkinson's disease. Most of these scales include items that require the clinician or a caregiver to make a judgment about whether the person seems to be or acts apathetic. For example, a commonly used measure, the Apathy Evaluation Scale, instructs clinicians to base their ratings on both verbal and nonverbal information (Marin 1991). Given the reliable finding that people form negative impressions of individuals with Parkinson's disease and tend to rate them as more depressed, bored, and less engaged, there is a real concern that judgments of apathy may be inflated by the appearance of the expressive mask (Bogart 2011).

Although Parkinson's disease has been the most widely studied expressive disorder in the thin-slice paradigm, individuals with facial paralysis comprise a unique population ripe for further research. Whereas Parkinson's disease is a neurodegenerative progressive disorder that can reduce expressivity in all communication channels, facial paralysis (e.g., Bell's palsy or Moebius syndrome) typically limits only one—the face. This raises the possibility that people with facial paralysis can compensate for their lack of facial expressiveness by increasing expressiveness in other channels.

Bogart and colleagues (2012) predicted that people with congenital forms of facial paralysis would be more likely to have developed compensations over time in comparison with people with acquired forms. Trained coders rated thin-slice video clips of people with facial paralysis talking about their emotions. Indeed, people with congenital facial paralysis used more compensatory expressive behavior (i.e., increased intensity and frequency of body and vocal expression). Expressive disorders offer a unique way to examine theories involving communication. For example, facial paralysis is a naturally occurring situation in which facial expression is “held constant.” Future studies can examine how perceivers integrate information from an inexpressive face and an expressive body and voice to form impressions. Health care professionals may be able to improve the accuracy of their impressions of patients with these expressive disorders by looking for cues in the expressive channels that remain intact. In the case of Parkinson’s disease, practitioners should pay attention to the content of the patients’ speech, and when in doubt, ask patients directly about symptoms related to apathy and depression. For people with facial paralysis, practitioners should look for cues in the patients’ body, voice, and speech.

### **Thin-Slice Impressions by People with Expressive Disorders**

One form nonverbal sensitivity can take is that of emotion contagion. Simple exposure to another’s emotion can lead others to adopt facial musculature that matches that emotion expression and even to feel that emotion as well (Dimberg et al. 2000, Hatfield et al. 1994). It has been proposed that people recognize facial expressions and, more generally, others’ emotions by mimicking observed expressions, which in turn generates the corresponding emotional experience in the observer (Goldman & Sripada 2005). Emotion contagion, therefore, has often been proposed to be a healthy trait, one that enhances empathy and understanding of others (see Hatfield et al. 1994). Yet it can have negative consequences as well. For instance, if one is in a negative environment, emotion contagion could be damaging because an individual “catches” the negative emotions in his or her environment. Indeed, young women in emotionally negative family environments who are likely to experience emotion contagion exhibit unhealthy eating attitudes and habits in response to such negative environments (Weisbuch et al. 2011).

The proposal that people can understand others’ inner and emotional states by mimicking their facial expressions (which consequently provokes those states in the perceiver) predicts that people who have difficulty mimicking expressions—because of expressive disorders such as Parkinson’s disease or facial paralysis—should have difficulty recognizing expressions. There have been only a few small studies of the facial expression recognition ability of people with facial paralysis. A study of three participants with Moebius syndrome, a condition characterized by congenital facial paralysis, found that they made several more mistakes than a control group made, but these differences were not significant, possibly due to low statistical power (Calder et al. 2000). A large study of emotion recognition among people with facial paralysis, with 37 people with Moebius syndrome and 37 matched controls, found no differences in emotion recognition ability and found that accuracy was not related to the degree of facial paralysis (Bogart & Matsumoto 2010). The fact that people with facial paralysis are able to recognize emotions in these two studies establishes that facial mimicry is not necessary for facial expression recognition.

Numerous investigators have examined the emotion recognition ability of people with Parkinson’s disease. Unlike facial paralysis, which usually involves relatively specific impairments in facial expression resulting from isolated lesions in areas such as the pons or peripheral nerves, Parkinson’s disease involves central progressive destruction in dopaminergic pathways in the basal ganglia, an area implicated in recognizing emotions (Adolphs 2002). Furthermore, as Parkinson’s disease progresses, it impairs cognition, working memory, and motor planning, and may be associated with

endogenous depression. A meta-analysis of 34 studies found a robust deficit in the ability to recognize facial and vocal expressive cues in patients with Parkinson's disease (Gray & Tickle-Degnen 2010). These results do not appear to be due to depression or visuospatial impairments. However, a small body of research suggests that general deficits in executive functioning may play a role in the emotion recognition difficulties among people with Parkinson's disease (Dara et al. 2008, Pell & Leonard 2005). Taken together, these findings suggest that people with Parkinson's disease experience numerous social functioning challenges: Not only do others have difficulty recognizing their own emotions, but people with the condition may also be unable to recognize others' social cues, resulting in a bidirectional emotional disconnect. This may be particularly challenging for doctor-patient interactions, where the therapeutic relationship may suffer.

### **Thin Slicing Clinically Relevant Traits**

The studies reviewed above demonstrate the contexts in which people can detect clinically relevant traits from thin slices. Personality disorders, anxiety, depression, and even suicide attempts and outcomes can be detected from others' nonverbal behavior. In certain contexts, thin slicing others can be difficult, such as those with expressive disorders, who also can reciprocally have deficits in perceiving others' nonverbal behavior (such as in Parkinson's disease). We next turn to the utility of thin slices in predicting clinical outcomes.

## **THIN SLICES PREDICTING OUTCOMES**

### **Clinician and Patient Outcomes**

Not only can thin slices be used to accurately detect whether an individual has a disorder, but ratings based on thin slices also can predict future outcomes. For instance, ratings made from thin slices of clinicians' nonverbal behavior predict outcomes of their patients. In one study, physical therapists were video recorded during interactions with elderly inpatients (Ambady et al. 2002a). Naïve participants judged 20-second silent video clips from these interactions, and their ratings of how distant physical therapists seemed during these interactions predicted patients' clinical improvement after discharge, and even at three months' postdischarge. Nonverbal behaviors of not smiling and looking away from the patient were associated with decrements in patients' physical and cognitive functioning, whereas smiling and nodding were associated with improvements in patients' physical and cognitive functioning. Moreover, distancing behavior was also associated with increased confusion at discharge. Thus, the outcomes of patients can be predicted from thin slices of clinicians' nonverbal behavior.

Another study examined whether physicians' verbal and nonverbal behavior, sampled from interviews, could predict whether alcoholic patients were successfully referred for treatment (Milmoie et al. 1967). While discussing their experiences with alcoholics, physicians were audio recorded, and these, on average, 1.5-minute responses were made into transcripts (speech only), content-filtered audio (vocal tone audible), and full audio clips (speech and vocal tone audible). Doctors who were rated as less angry in the content-filtered thin slices were more successful in referring alcoholic patients (who had arrived in an emergency room) for further treatment at an alcoholic clinic. Additionally, for full (noncontent-filtered) audio clips, lower ratings of anxiousness were also associated with more successful referrals. No ratings from the speech-only condition (transcripts) predicted referral success.

Not only can patient outcomes be predicted from thin slices, but so can clinician outcomes. As briefly described previously, one study recorded 114 conversations between surgeons and patients during routine medical visits (Ambady et al. 2002b). Naïve judges rated either full audio

(including surgeons' speech) or content-filtered 10-second clips. Ratings of vocal tone (but not speech) predicted whether malpractice claims had been filed against surgeons in the past. Surgeons who had higher ratings of dominance and lower ratings of concern were more likely to have been sued relative to surgeons with lower ratings of dominance and higher ratings of concern. It is striking that it was only how surgeons spoke and not what they said that was associated with whether patients had previously launched a malpractice suit against them. Perhaps a dominant and low-concern voice implies indifference on the part of the surgeon, predicting malpractice claims following negative outcomes. In summary, both patients' and clinicians' outcomes can be predicted from thin slices of behavior.

## Well-Being and Longevity

Thin slices of nonverbal behavior can predict future well-being. In one study, bereaved participants spoke about their recently deceased spouse at six months postloss (Bonanno & Keltner 1997). Expressions of negative emotion during those five-and-a-half minutes predicted even more severe grief 14 and 25 months later, as well as poorer health. These outcomes were particular to anger rather than sadness. In contrast, positive emotion, such as laughing and smiling, expressed during those few minutes predicted reduced grief 14 and 25 months later. Those positive expressions were associated with better relationships with current significant others as well as more dissociation from distress (Keltner & Bonanno 1997). Positive expressions also predict psychological adjustment for survivors of sexual abuse (see Bonanno et al. 2007, Gupta et al. 2011). In yet another context, that of adjusting to a recent marital separation, from such positive expressions naïve judges can accurately perceive current psychological adjustment; furthermore, ratings of vocal tone predict future adjustment to marital separation (Mason et al. 2010).

In another study, while husbands and wives discussed a conflict, negative emotion expressed by either person predicted dissatisfaction with the marriage as well as whether the couple eventually divorced (Gottman & Levenson 1992). Follow-up work demonstrated that divorce was predicted by negative displays including criticism, contempt, and stonewalling as well as the absence of positive affect, and divorce could be predicted even 14 years later (Gottman & Levenson 2000). Ratings made from the way married couples discussed a conflict could predict not only whether couples divorced but also when they divorced (either earlier or later in the marriage). The same study also demonstrated that affect expressed outside of conflicts could predict divorce, such as when telling one's spouse about what happened that day. Even more remarkable, the ratings made from the first three minutes of an interaction between two newlyweds predicted whether they got divorced six months later (Carrère & Gottman 1999).

Marital satisfaction can also be predicted from a single nonverbal time point. In one study, researchers (Harker & Keltner 2001) collected women's 1958–1960 college yearbook photos (these participants had also participated in an earlier study on personality). Expressing a genuine Duchenne smile in a single photo at age 21 was associated with being married by age 27, staying married, and having a satisfying marriage 30 years later. Additionally, expressing genuine smiles was associated with increases in competence and achievement orientation and decreases in experiences of negative emotion and in susceptibility to prolonged experiences of negative affect. Finally, positive emotion, as expressed in that single time point at age 21, predicted enhanced well-being throughout life, up to 30 years later, including greater life satisfaction, better relationships with others, and fewer psychological and physical difficulties. These effects all held when controlling for the physical attractiveness of the targets (but see Freese et al. 2007). Similarly, the smile intensity of individuals in both yearbook and childhood photographs has been found to predict whether those individuals would be divorced later in life (Hertenstein et al. 2009).

Positive emotion expressed in photographs can even predict individuals' biological longevity. Using photographs of Major League Baseball players from the 1952 Baseball Register, researchers coded whether players displayed no smile, a partial smile, or a Duchenne smile in their photograph (Abel & Kruger 2010). In addition, for these players a number of predictors of longevity could be controlled for (e.g., body mass index, physical fitness and performance, marital status, and college attendance). Genuine smiles from that one time point were associated with longer lives (see also Danner et al. 2001).

### **Predicting Clinical Outcomes**

Thin slices of nonverbal behavior can predict a range of future outcomes. Thin slices can predict psychological adjustment to divorce, separation, bereavement, and sexual abuse. Recordings of newlyweds and married couples can predict actual divorce and marriage outcomes, and finally, a rating from a single photograph can predict well-being and longevity.

### **THIN SLICING ON THE INTERNET**

The Internet has created a new medium to examine impressions from thin slices. For example, one study asked observers to judge personalities of individuals from their personal websites and found that ratings from websites were related to targets' actual personalities (Vazire & Gosling 2004). More commonly today, people present themselves on online social networking profiles (e.g., Facebook), and perceivers can accurately identify expressivity and likeability from these profiles (Back et al. 2010, Ivcevic & Ambady 2012, Waggoner et al. 2009, Weisbuch et al. 2009). For example, impressions of extraversion and conscientiousness made from information contained on one's Facebook page and made from posted photographs correlated with self reports and peer reports of targets' extraversion and conscientiousness, respectively (Ivcevic & Ambady 2012). Thus, in the many channels of display on Facebook profiles (e.g., photos, personal information, number of friends), individuals' personality traits are indeed visible.

Pertinent to the current review, traits such as narcissism are also perceptible from Facebook profiles; features on profiles such as the frequency of posting self-promoting information accurately predict narcissism as indicated by profile owners' self-reports (Buffardi & Campbell 2008). In another study, judges rated Facebook profile owners on a variety of traits, including social anxiety, loneliness, neuroticism, and depression (Fernandez et al. 2012). The study also collected profile owners' self-reports of social anxiety and depression. Although Facebook profiles can display symptoms of the profile owner's depression (Moreno et al. 2011), and these can relate to self-reported depression symptoms (Moreno et al. 2012b), judges' ratings of depression in this study (Fernandez et al. 2012) were not related to scores on the Beck Depression Inventory-II (BDI-II; Beck et al. 1996). Ratings of loneliness, however, were correlated with scores on the BDI-II. In addition, ratings of social anxiety were related to profile owners' reported social interaction anxiety (beyond self-reported depression and neuroticism; Fernandez et al. 2012). In another study, which examined problem drinking, judges' coding of intoxication and problem drinking references on Facebook profiles predicted targets' scores on a test that identifies individuals at risk for problem drinking (Moreno et al. 2012a).

Recent work has also examined smile intensity in online photographs. In Facebook profile photos, the more intense first-semester college students' smiles were, the more life satisfaction they had during that semester and the more life-satisfaction they had 3.5 years later, right before they were about to graduate (Seder & Oishi 2011). Moreover, it seemed that the relationship between smile intensity in the profile photo and future life satisfaction (3.5 years later) was partially mediated

by life satisfaction during the first semester of college. The Internet is allowing individuals to express themselves across new channels, and from these online thin slices, it seems that naïve perceivers can accurately identify a variety of traits, some of which are related to mental disorders and to future life outcomes.

## CONCLUSION

The reviewed studies demonstrate that a variety of clinically relevant traits and outcomes can be accurately perceived in thin slices. Clinicians have long been using nonverbal behaviors when diagnosing physical conditions, for example, looking for certain facial expressions and nonverbal behaviors when assessing pain. Personality disorder-specific traits can be accurately perceived in thin slices of nonverbal behavior, and even psychopathology can be accurately perceived in videos of targets as well as in facial photographs (e.g., Fowler et al. 2009, Friedman et al. 2007, Holtzman 2011). Both depression and anxiety can be accurately perceived in thin slices (see Harrigan et al. 2004; Hinchliffe et al. 1970, 1971; Waxer 1974, 1976; Yang et al. 2013). State and trait anxiety, for instance, are both detectable in thin slices, but in different channels. State anxiety is more reliably detected in audio channels, whereas trait anxiety is more reliably detected in video channels (Harrigan et al. 2004). Even suicide attempts and outcomes can be predicted from thin slices (Heller & Haynal 1997, Kleiman & Rule 2013; see also Ekman & Friesen 1969).

Not only are targets' current disorders and clinically relevant traits detectable from thin slices, but so are their future outcomes. Whether a surgeon is sued for malpractice or a physician successfully refers a patient for alcoholism treatment can be predicted by naïve judges' ratings of their vocal tone (Ambady et al. 2002b, Milmoie et al. 1967). Client outcomes can also be predicted from thin slices of clinicians' behavior (Ambady et al. 2002a) and from clients' behavior (e.g., Bonanno et al. 2007, Gupta et al. 2011). Even naïve judges' ratings of a single photograph can predict psychological adjustment to distressing events (e.g., divorce, bereavement, abuse) as well as actual lifelong well-being and longevity (e.g., Abel & Kruger 2010, Bonanno & Keltner 1997, Harker & Keltner 2001). With new technology, the Internet is providing new channels and media to present thin slices of the behavioral stream, and ratings from these new channels also predict clinically relevant traits and outcomes, such as social anxiety (Fernandez et al. 2012) and life-satisfaction (Seder & Oishi 2011).

The frequency with which people with expressive disorders are misperceived illustrates the great extent to which clinicians and lay people alike rely on thin slices in everyday life as well as in the clinic (Tickle-Degnen & Lyons 2004). Typically, flat affect in the face, body, and voice indicates depression or apathy, but in disorders such as Parkinson's disease, which prevents expression with these channels, patients are at risk of being misdiagnosed with one of these conditions (Bogart 2011).

Although a long tradition of research has studied accurate perceptions of targets from thin slices (see Ambady & Weisbuch 2012), only a small subset of this work examines thin slicing in the clinical context. Thin slices provide a unique glimpse into a client's states and traits. Certain nonverbal behaviors are difficult to control and thus can provide a window to a client's mental world unmediated by self-presentation strategies (Choi et al. 2005) as well as provide a better indicator of person traits than does verbal behavior (see Weisbuch et al. 2010). Judgments made from thin slices thus could provide a diagnostic complement to more traditional instruments.

Future work needs to systematically study various channels and their predictive validity across a variety of domains and outcomes (e.g., depression, anxiety, suicide), and more work needs to be done to identify the valid cues to clinical disorders, cues that can lead to judgments accurate enough for clinical utility. In addition, there is a dearth of clinically relevant cross-cultural thin-slice work.

For example, social psychological research on the ingroup advantage shows that people within the same social group (e.g., race, ethnicity, culture) form more accurate impressions about others within, relative to outside, their social group (see Wang et al. 2009, Young & Hugenberg 2010). This may indicate that clinicians who are similar to their patients will provide better assessments of clients. Furthermore, display rules about what is acceptable to express within a culture, and differences in expressions, may lead to misunderstandings during clinician-patient interactions (Marsh et al. 2003, Matsumoto 1990). With future work, clinicians will be able to assess clients across a variety of domains using new criteria that overcome limitations of existing methods (e.g., those that rely on self-report; see Nisbett & Wilson 1977), complementing those and other methods to help treat clients and to improve their practice.

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