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# Testing safety commitment in organizations through interpretations of safety artifacts

Gil Luria<sup>a,\*</sup>, Anat Rafaeli<sup>b,1</sup>

<sup>a</sup> University of Haifa, Faculty of Social Welfare & Health Sciences, Department of Human Services, Mount Carmel, Haifa 31905, Israel

<sup>b</sup> Technion Institute of Technology, Faculty of Industrial Engineering and Management, Haifa 32000, Israel

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## Abstract

*Problem:* Safety culture relates to injuries and safety incidents in organizations, but is difficult to assess and measure. We describe a preliminary test of assessing an organization's safety culture by examining employee interpretations of organizational safety artifacts (safety signs). *Method:* We collected data in three organizations using a new safety culture assessment tool that we label the Safety Artifact Interpretation (SAI) scale; we then crossed these data with safety climate and leadership evaluations. *Results:* SAI were interpreted by employees in accordance with two conceptually distinct themes that are salient in the literature on organizational safety culture: safety compliance and commitment to safety. A significant correlation exists between SAI scores and the organizational safety climate. A similar (though insignificant) relationship was observed between SAI scores and leadership ratings. *Impact on industry:* Employee perceptions and interpretations of safety artifacts can facilitate assessments of safety culture and can ultimately lead to understanding of and improvements in the level of organizational safety.

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## 1. Introduction

Projective tests are clinical tests in which people respond to a vague stimulus by describing what they see in the stimulus (Exner, 1996). For example, in the famous Rorschach test people look at 10 inkblots, and in the TAT test they look at 10 pictures. Both tests are used in clinical psychology for personality assessments (Exner). Projective tests are also used in marketing research to circumvent people's reluctance to discuss their feelings about a particular product or service. In this case techniques such as sentence completion and word association evoke thoughts or feelings that are independent of people's self-awareness (Churchill, 2006, p. 354). In both cases the process is of psychological projection, wherein people's internal repre-

sentation of the world is transferred to the way they view and interpret objective elements in their environment (Exner).

Projection occurs because individual intake of perceptual input is influenced by individual needs, interests, and overall psychological state (Frank, 1939; Churchill, 2006;). Projective testing is used all over the Western world to assess and to reveal hidden psychological tendencies (Fram & Cibotti, 1991). Projection leads people to identify their own hidden qualities by describing a seemingly clear stimulus. We suggest that projection also occurs when employees view and interpret seemingly objective organizational artifacts, and especially safety enforcement artifacts, such as safety signs. In other words, through projection, people can identify the hidden traits or qualities of an organization.

Similar to people, organizations also have both obvious and hidden traits and qualities. Argyris and Schon (1996), for example, who analyzed organizational learning, distinguish between "espoused theories" and "theories-in-use." Espoused theories are formal declarations regarding the organization, while theories-in-use are referred to as qualities that are evident from organizational

\* Corresponding author. Tel.: +972 4 8288663; fax: +972 4 8249282.

E-mail addresses: gluria@univ.haifa.ac.il (G. Luria), anatr@ie.technion.ac.il (A. Rafaeli).

<sup>1</sup> Tel.: +972 4 8294421; fax: +972 4 8235194.

actions. This distinction is highly material to organizational safety: formal safety declarations (which are mostly pro-safety and easy to measure) are “espoused theories” and frequently differ from daily organizational activities, which reveal the “theory-in-use.” Organizational practices reflect actual (rather than theoretically espoused) commitment to safety.

Unraveling an organizational safety culture can be done by examining routine in-use organizational safety practices; observing the way things are actually done in an organization affords an inside view into the organization safety practices (Schein, 1983). Such unraveling is critically important because human behavior can account for up to 85% of organizational safety incidents (National Safety Council, 1999). We suggest here that the idea of projective testing can be used to obtain an inside view into organizational hidden safety traits and qualities. We propose that collecting people’s reactions to organization safety signs is a way of obtaining an uninhibited view of the nature of safety commitment in an organization.

In particular, we propose the Safety Artifact Interpretation (SAI) measure. In this measure safety artifacts are the organizational inkblots: they are the stimuli that employees are asked to interpret and describe. Employees’ interpretations of safety artifacts are argued to offer a window into the nature and state of organizational commitment to safety. This projective process is consistent with Schein’s (1985) model of organizational culture: following Schein safety artifacts can be viewed as visible elements of the organizational culture, and perceptions and interpretations of these visible elements reveal more subtle and less clearly evident qualities of the organization.

### 1.1. Artifacts in organizations and organizational culture assessment

An artifact is defined in the Oxford dictionary as “an artificial product, something made by human beings” (Hornby, 1974, p. 43). Research on organizational artifacts concentrates on inanimate objects introduced by organizational members into their organization (Rafaeli & Pratt, 2006). Key artifacts that have been investigated include employee dress (Rafaeli & Pratt, 1993), buildings (Nasar, 1994), vehicles (Rafaeli & Vilnai-Yavetz, 2004), logos and emblems (Rafaeli, Sagi, & Derfler, in press), and safety signs – on which this study focused (Steyvers & Johnson, 2005).

Organizational research typically views artifacts as symbols (Jones, 1996), that is as “something that stands for or suggests something else by reason of relationship, association, convention, or accidental resemblance” (Webster’s New Collegiate Dictionary, 7th edition: 892). Pratt and Rafaeli (2001) suggest that physical objects are in themselves elements of a language that can help identify the nature of a relationship between individuals and organizations. Pratt and Rafaeli (1997) found that individuals and organizations find it easier to manipulate and discuss artifacts (in their example: employee dress) than to discuss more abstract issues (in their case: organizational identity). This is akin to Morgan’s (1985) suggestion that symbols provide a medium through which individuals communicate and also engage with their environment and the reality it embeds.

Meanings attributed to artifacts in an organization are not random; rather, they manifest deeper assumptions and values that are the foundations of the organizational culture (Schein, 1985). Extending the argument that artifacts can communicate values and assumptions in an organization, Pratt and Rafaeli (2001) argued that the way an artifact is perceived and interpreted is socially constructed and therefore draws from the social environment (Berger & Luckman, 1967). In other words, social groups infuse artifacts with meanings. Employees may assume that the meaning they ascribe to an artifact in their organization is objective, but in fact these meanings are socially ascribed to members of the organization by the implicit values that prevail in the organization. Implicit values become assumptions that influence the way employees think of and interpret organizational artifacts.

Artifacts thus simultaneously symbolize a culture and draw their meaning and interpretation from the organizational culture or values (Hatch, 1997; Schein, 1990; Trice & Beyer 1993, Yanow, 1998). Schein (1990) described artifacts as the visible parts of the otherwise invisible organizational culture (see also Trice & Beyer, 1993).

Culture can also be a group level variable: culture of a group is the pattern of shared basic assumptions that the group adopts in working out problems and engaging in external adaptation and internal integration. Group and organization culture is taught to new members through the socialization process in which people are taught the ways that members of the group perceive, think, and feel (Schein, 1992). Hence, culture can lead to shared interpretation of an artifact, and the interpretation of the same artifact may differ from one culture (and therefore one organization) to another.

Morris and Peng’s (1994) study provides a vivid example of how culture influences the way that people interpret a seemingly clear artifact and demonstrates the influence of group culture on individuals’ interpretation. Morris and Peng asked Anglo-American and Chinese-American students who saw a picture of a group of swimming fish to interpret the relationship of one fish to the rest of the group. Their data demonstrated different perceptions of the same picture: the Anglo-Americans interpreted the relationship in a fashion that represents their socialization in an individualistic culture, while the Chinese-Americans interpreted the same picture in a fashion that represents their socialization in a collectivistic culture (Markus & Kitayama, 1991). Hence, Morris and Peng’s results elevate the idea of artifact interpretation to a group level of analysis.

Dynamics similar to those depicted by Morris and Peng (1994) can be argued to occur in other social groups. For example, different groups or departments within organizations can embody distinct cultures and influence the way their members view seemingly objective elements of the environment (Brown, 1995; Martin, 1992; Martin & Siehl, 1983; Schneider 1990). In a process of projection, interpretations of organization artifacts by members of organizational groups or departments can serve as a window to a group-level or organization-level culture. Employees can report their interpretations of artifacts more freely and easily than deep values and basic assumptions (Morgan, 1985), so

interpretations of artifacts can be suggested to be a useful vehicle for identifying deep and abstract culture values.

Next we suggest one example of using artifact interpretation to learn more about an organizational culture – the use of interpretations of safety artifacts to learn about an organization's safety culture.

### 1.2. Organizational Safety Culture and Organization Commitment to Safety

Safety statistics are shocking: 9 of every 100 employees in the manufacturing sector experience work injuries that require medical attention; each year 4,800 employees in the United States die from work-related injuries; and each year 3,900,000 employees sustain injuries leading to a loss of at least one work day (National Safety Council, 1999). The estimated annual cost of poor safety is estimated at \$121 billion (National Safety Council). The most important cause of critical safety incidents is human action (Maurino, Reason, Johnston, & Lee, 1995; Reason, 1990), which can typically be attributed to poor management systems (Peterson, 2000).

One key organizational concept underlying managerial systems that maintain employee safety is a culture of safety (Pidgeon, 1991; Peterson, 1993; Simard & Marchand, 1997). Safety culture is known to be related to and is considered to be a central predictor of safety outcomes. For example, safety culture was argued by the International Atomic Energy Agency (IAEA) to be a key factor underlying the Chernobyl nuclear reactor incident (see Cox & Flin, 1998). And safety culture has been held responsible for other major safety incidents such as the King's Cross Underground fire in London and the Piper Alpha oil platform explosion in the North Sea (Cox & Flin, 1998; Pidgeon, 1998), the aviation incident of Continental Express Flight 2576 in Texas in September 1991 (Meshkati, 1997), and the Columbia space shuttle tragedy (Columbia Accident Investigation Board, 2003).

Definitions of safety culture vary, but most definitions share the basic assumption that members of organizations with a good safety culture are committed to and value safety. Carroll (1998) elaborated that a good safety culture is when practices place high value and prioritize employee safety, where expectations prevail to preserve and enhance employee safety, where employees take personal responsibility for safety, and where employees are rewarded for enhancing safety. Cox and Flin (1998) noted that the safety culture of an organization is a product of individual and group values, attitudes, and patterns of behavior that determine commitment to and proficiency of an organization's health and safety management.

Yet a safety culture cannot be a product of organizational rules and regulations. Pidgeon (1991) explained that employees in a firm with a good safety culture must hold positive attitudes toward safety practices. It is impossible to establish formal rules for all organizational hazards, making norms and values indispensable elements of minimal safety incidents. Norms and values provide guidelines for safe behavior and ensure safety in situations that are not covered by formal rules (Pidgeon, 1991).

Indeed, commitment to safety is mentioned as the key to a safety culture (Flin, Mearns, O'Connor, & Bryden, 2000). An organization's commitment to safety is arguably reflected in efforts to ensure that every aspect of the organizational operations is modified to maintain safety (Wiegmann, Zhang, Von Thaden, Sharma, & Mitchell Gibbons, 2004). Commitment would be evident, therefore, in organizational equipment and procedures as well as employee selection and training. Safe organizations have a "culture of safety commitment," which includes inherent acceptance and involvement in maintaining safety (Griffin & Neal, 2000; Geller, Roberts, & Gilmore, 1996).

In contrast, members of organizations can practice safety merely because they comply with rules and external pressures rather than because of internal acceptance and commitment to safety (Griffin & Neal, 2000; Marchand, Simard, Carpentier-Roy, & Ouellet, 1998). Such organizations can be said to maintain a "culture of safety compliance," wherein people behave in a safe manner not because they perceive safety as an important organizational goal, but because there is an external law that they feel required to obey. In compliance cultures, employees may behave unsafely because behaving safely contradicts with other important goals such as productivity or speed (Fahlbruch & Wilpert, 1999; Pate-Cornell, 1990).

In a compliance culture, therefore, employees embrace safety only to avoid other costs and only when safe behavior does not accrue other costs. In a commitment culture, on the other hand, safety is an inherent value that employees come to internalize. In such organizations, employees assume safety to be supremely important and behave in a safe manner even when safety is at odds with other aspects of performance. Such a commitment to safety addresses the proactive element of 'taking charge' of safety (Morrison & Phelps, 1999) and leads to what Geller et al. (1996) called 'propensity to actively care for safety.'

#### 1.2.1. Organizational Commitment to Safety and Interpretation of Safety Artifacts

Assuming that employees perceive and interpret safety artifacts through the lens of the local safety culture, employee perceptions of organizational artifacts are likely to reflect the type of commitment to safety that prevails in the organization. In other words, perceptions and interpretations of safety artifacts in a specific organizational unit likely reflect local organizational assumptions about safety. Assumptions of commitment and of compliance would therefore be evident in the way employees interpret organizational safety artifacts:

**Hypothesis 1.** Employee interpretation of safety artifacts in a given organizational unit manifest as either commitment to safety or compliance with safety.

### 1.3. Artifact Interpretation and Safety Climate

Perception and interpretation of safety artifacts in an organizational unit is likely also related to the nature of the safety climate in the organization. The distinction between culture and climate is not always clear, with some authors simply declaring that culture is not climate (Schwartz & David,

1981) and others suggesting that the distinction between climate and culture is methodological, because research on organizational climate is based on a social psychology framework, while research on culture is based on anthropology (Glick, 1983). Denison (1996), however, suggested that culture refers to deep structures of organizations, rooted in the values, beliefs, and assumptions held by organizational members. In contrast, Denison refers to climate as limited to aspects of the social environment that are consciously perceived by organizational members.

Wiegmann et al. (2004) discussed the difference between safety culture and safety climate, using the metaphor of the difference between traits and psychological states in personality (see for example Spielberger, 1966). Wiegmann et al. (2004) suggested that safety culture is a more enduring characteristic of an organization that is reflected in a consistent way of dealing with critical safety issues (similar to the way that individual personality traits are enduring and reflected in the way that individuals deal with critical issues). In contrast, Wiegmann et al. (2004) refer to safety climate as a relatively temporary state that changes with or adapts to specific operational or economic circumstances (similar to the way that individual psychological states vary according to the particular situation individuals encounter). In this view climate is viewed as culture in the making, with culture conveying a broader and more profound meaning that is manifested in climate. Accordingly, climate should be the outcome of culture, and organizations with high safety culture should also have a high safety climate.

Following this logic, we refer here to safety climate as the aggregation of employees' perceptions of policies, procedures, and practices (PPP) that relate to the importance of safety in the organization (Zohar, 1980; Zohar & Luria, 2003, 2004, 2005). Our measure of the level of *safety climate in an organizational unit* is obtained by collecting and averaging responses of individual employees in the unit to a safety climate scale. The level of safety climate in a given unit can therefore be high or low: when employees perceive a high safety-climate level, they perceive that the organizational PPP's reflect commitment to safety.

In other words, a high safety climate means that the safety facet emerges as holding high importance compared to other facets of the organizational climate (Zohar & Luria, 2004, 2005). In contrast, a low safety-climate level reflects perceptions that the safety facet is relatively low in importance compared to other facets. This measure of the safety climate is based on what employees perceive, and is independent of what managers formally declare about safety. The enacted safety climate is based on perceptions of PPP's and represents the extent to which safety is of high priority. Previous research found this measure of safety climate as negatively related to both safety incidents (Clarke, 2006; Wallace, Popp, & Mondore, 2006; Zohar & Luria, 2004) and frequency of unsafe behaviors (Neal & Griffin, 2006; Zohar & Luria, 2005).

Group-level safety climate mediates the relationships between the safety climate at the organizational level and safety behaviors at the individual level (Zohar & Luria, 2005). Thus, within an organization that boasts a high level of organizational-level safety climate, unsafe employee behavior

may occur in departments that maintain a low level of group-level safety climate. Group-level safety climate is therefore the most relevant level of analysis for predicting employee safety performance. Lok and Crawford's (1999) multi-level study supports this assertion, since they found the department level sub-culture to be more strongly related to employee commitment than organizational level culture. Similarly, Simard and Marchand (1994) suggested the propensity of workgroups to take safety initiatives at the shop-floor level as a key correlate of (lower) frequency of lost-time due to work safety incidents.

In this vein we can predict that employees of departments with a culture of commitment to safety likely also maintain perceptions of a high safety-climate. In contrast, employees of departments with a culture of compliance with safety rules can be expected to maintain perceptions of a relatively low level of safety climate. Connecting these predictions to the prediction of Hypothesis 1 wherein employee interpretation of safety artifacts indicates the extent to which a department maintains a commitment or compliance culture allows us to present the following hypothesis:

**Hypothesis 2.** The extent to which employees interpret safety artifacts as conveying safety commitment correlates with the level of safety climate in the group.

#### *1.4. Leadership as an Antecedent of a Culture of Safety Commitment*

Organizational leadership and socialization are the processes that produce an organizational culture, whereby members of an organization undergo cognitive transformation into sharing organizational assumptions (Schein, 1983, 1985, 1991). Transformational leadership (TL), where leaders are charismatic, inspiring, stimulating, and considerate (Bass & Avolio, 1994), is the style of leadership that is likely to be most effective at instilling organizational values and culture into members. Avolio and Bass (1995) further suggest that transformational leaders who focus on developing employee potential, and give individual consideration to each employee can create group norms that coalesce into the organizational culture.

The individual consideration component of transformational leadership is known to effect leaders' safety-related behaviors (Yukl, 1998). Transformational leaders maintain closer relationships with their followers, which increases their concern for employees' welfare (Yukl, 1998). In situations involving an elevated risk of injury such concern also applies to physical wellbeing (Hofmann & Morgeson, 1999), and therefore likely results in a higher safety orientation (Barling, Loughlin, & Kelloway, 2002; Zohar, 2002).

Accordingly, transformational leaders can be expected to exhibit safety orientation and commitment to safety, thereby creating a good safety culture. And employees working under transformational leadership can be predicted to view artifacts as manifesting leader and organizational concern for their wellbeing (commitment to safety). Following this logic we hypothesize that employees managed by leaders exhibiting high transformational leadership will interpret safety artifacts (will

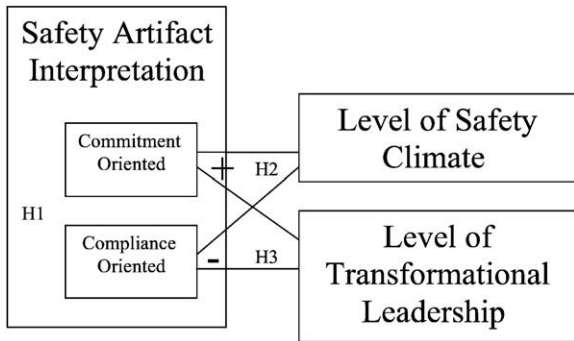


Fig. 1. Hypothesis SAI and safety climate/transformational leadership relationship.

respond to the SAI scale) as reflecting greater organizational commitment to safety than employees whose department leaders display low transformational leadership.

**Hypothesis 3.** Group scores of the leader's transformational leadership correlate with members' interpretation of safety artifacts (the SAI scale – see Fig. 2).

Fig. 1 graphically summarizes the relationships suggested in Hypotheses 2 and 3.

## 2. Method

### 2.1. Overview

The participants in this study were 520 line workers from 22 departments in three factories whose management agreed to participate in the study. It was explained to managers that climate, artifact perception and interpretation (the SAI scale – see Fig. 2), and leadership questionnaires were to be completed on the organizational premises during work hours. In all the departments we administered short (1-2 minutes) SAI questionnaires during working hours, but only 12 departments agreed to participate in the leadership and safety-climate questionnaires because this measure required a 15 minute break for all department members. In return for participation in the study, we offered management elaborate feedback about the safety level in the factory. Employees were not obligated to participate, but if they did, full confidentiality and anonymity were guaranteed. The response rate for the questionnaires was 81%.

### 2.2. Participating Factories

The first factory was a modern food plant that specializes in a range of prepared salads, and employs about 100 line workers, most of whom are male (67%). The second factory was another modern food plant that specializes in ice-cream and other frozen desserts, and employs approximately 120 line workers, most of whom are female (58%). The third factory was a plastics plant that specializes in products for the textile industry and employs about 300 line workers, most of whom are male (87%).

Data were collected in two phases:

*Phase 1: Qualitative study of artifact perception and interpretation:* open-ended questions were presented to employees of 22 departments in the three organizations. Employees were asked for their interpretations of and opinions about three safety artifacts – safety signs that were clearly evident in their work environment (see below for more detail). We distributed 89 open-ended questionnaires to a sample of workers from the three factories. Content analyses of responses identified the key themes that employees associated with these artifacts.

*Phase 2: Quantitative study of employees' perceptions and interpretations of a safety sign common to and identical in all factories.* Based on the inductive findings of Phase I, a structured survey was developed for assessing employee perceptions of the same artifacts (safety signs). The survey collected employee perceptions of three signs that appeared in all three factories, and also included a measure of the safety climate (based on Zohar & Luria, 2005), and transformational leadership in the employee's department. Employees responded to the survey individually and anonymously, noting only the name of the department on their questionnaire. The data were therefore collected at the individual level and then aggregated to the group level.

### 2.3. Measures

#### 2.3.1. Safety Artifact Interpretation (SAI)

We collected two measures of employee perceptions and interpretations of safety artifacts (safety signs). The qualitative



Fig. 2. Artifact 1 and the SAI scale: The artifact found in all departments. Used in Phase 1 and Phase 2 of the study. **Phase 1 (open ended SAI scale).** 1. In your opinion, why was this sign posted? 2. What does the sign tell you about the organization? **Phase 2 (multiple choice SAI scale).** 1. The sign was posted because ... a. Management wants to warn employees of potential risks. b. Management wants to protect employees. c. Management is complying with the law. d. I don't know why management posted this sign. 2. The sign tells me that the organization is ... a. Risky - there are risks in the work environment. b. A factory that takes care of its workers. c. A law-abiding organization. d. Scared of accidents.

measure was a brief, 1 page questionnaire that included a picture of a safety sign followed by three items, based on experience sampling methodology (ESM). ESM uses short, fact-oriented questionnaires to collect data concerning employees' work activities and work-related interactions at random intervals during their workday. ESM provides reliable data concerning daily activities and environment, and is not influenced by employee memory (see Alliger & Williams, 1993; Eckenrode & Bolger, 1995).

The criterion for the set of signs in the measure was their prevalence on the walls of the three factories. Based on this criterion, responses to the following three signs were collected in Phase 1 (see example of the scale in Fig. 2):

"Harmful Noise Zone – Hearing Protection Required"  
 "Observe Safety Measures – Someone at home is waiting for you"  
 "Careful – Wet Slippery Floor"

The questionnaire asked employees to answer two questions:

- (1) 'In your opinion, why was this sign posted?' and
- (2) 'What does the sign tell you about your organization?'

Responses to these two questions were open-ended and were analyzed using content analysis that focused on whether the respondent saw the posting of the sign as representing organizational commitment to safety or organizational compliance with safety requirements. This analysis revealed four key themes, as elaborated below.

In Phase 2 of the study, 201 employees from the four departments were surveyed. These employees were asked to answer the same two questions noted above but with respect to only one sign – a sign identified as present in all departments – "Use Ear Plugs – High Noise Area." Employees were asked to indicate their interpretation of this sign by selecting from a multiple-choice set of options, which were the key themes identified in Phase 1.

The analysis of the Phase 2 responses provided a measure of the percentage of employees in each department who view the safety sign as illustrating an organizational commitment to safety, or a symbol of a safety commitment culture and the percentage of employees who saw the posting of the sign as indicating organization compliance or a symbol of a safety compliance culture. A department was viewed as commitment oriented if most of its employees surveyed in Phase II selected responses indicating a commitment culture (see Fig. 2). Similarly, a department was viewed as compliance oriented if

most employees selected responses indicated a compliance culture from the multiple choice options.

*Group-level Safety Climate* was measured using a 5-item index (see Zohar & Luria, 2005). Responses were on a 5-point rating scale similar to the organization-level scale. Items cover various modes of interaction between supervisors and group members and provide an indication of the priority placed on safety and proactive safety practices versus competing organization goals such as production speed or schedules (Cronbach's Alpha reliability of this scale was 0.95). The level of the group level safety climate was measured by computing the mean of the responses to the five items of all the individual members in each group; a high score on this variable represents a high level of safety climate, or a high priority placed on safety in the department.

*Transformational leadership* of the supervisors of each group was measured with the relevant section of the Multifactor Leadership Questionnaire, using the nine highest loading items (MLQ-5X-Revised: Bass & Avolio, 1997). Sample items include: "My manager listens attentively to others' concerns;" "My manager gets others to look at problems from many different angles;" and "My manager goes beyond self-interest for the good of the group." Ratings were on a 5-point Likert type rating scale (1=to a small extent, 5=to a very great extent), and based on previous factor-analytic results (Avolio, Bass, & Jung, 1999; Carless, 1998) the nine items were considered as a single scale of transformational leadership (Cranach's Alpha=0.79).

### 3. Results

Through qualitative analyses of the data collected in Phase 1 of the study, we could examine what meanings employees attribute to the safety signs present at their work environment. Content analysis of the responses revealed four themes in the responses: (a) Safety sign as a literal safety notice; (b) Safety sign as an instance of organizational compliance with safety regulations; (c) Safety signs as an indication of managerial commitment to safety and concern for employee well-being; and (d) Other; Table 1 illustrates responses categorized into each theme.

As evident in Table 1, in some cases employees saw the signs as a literal instruction – a warning about a potential safety hazard. The other themes, however, suggest that safety signs are also perceived and interpreted as symbols rather than, or in addition to technical messages. There were two key types of symbolic interpretations, consistent with *Hypothesis 1*: (a) First, employees related the presence of safety signs to regulations,

Table 1  
Key examples of employees' interpretations of the open safety sign (SAI scale), from Phase 1

Themes:	Theme 1 Literal safety interpretation	Theme 2 Commitment to safety	Theme 3 Compliance with safety laws	Theme 4 Other
<b>Example 1</b>	'There are risks in the work environment'	'The sign tells us that we are working in a factory that takes care of its workers'	'The sign tells us that this is a law-abiding organization'	'Management is scared of accidents'
<b>Example 2</b>	'Warning of risks'	'They want to protect us' (the managers)	'The sign was posted in compliance with the law'	'I don't know why the managers posted the sign'

Note: N=202 employees from 22 departments.

noting that signs are posted in order to comply with national safety laws; (b) Second, employees connected the posting of the safety signs to the motivation of their managers, and specifically to the desire of management to protect the staff and to maintain safety.

Phase 2 was intended to put a quantitative frame on the themes identified in Phase 1. In Phase 2, employees responded by selecting one of the themes identified in Phase 1 as most applicable to a particular sign. These selections provided a means of comparing the different departments and a vehicle of connecting artifact perception and interpretation to departmental features such as safety culture or transformational leadership.

Table 2 provides descriptive statistics and inter-correlations among the variables assessed in Phase 2. As evident in Table 2, the employees responding in Phase 2 also viewed safety signs as indicating either managerial commitment to safety (e.g., a desire to protect the staff) or managerial compliance with safety regulations (e.g., compliance with laws). Thus, just like the findings of Phase 1, the results of Phase 2 supported Hypothesis 1 by indicating that employees interpret signs as conveying symbolic meanings that are compatible with the two types of climate identified in the safety climate literature.

Our data reveal that employees in some departments interpret safety artifacts to be an indication that their organization is compliant with the external demands of the law, while in other departments employees perceive the artifacts as symbolizing organizational care and commitment to employees' safety and wellbeing. Summing up all the responses showed that 90% of the employees selected either the option related to compliance with the law or the option related to commitment to safety, which suggests that these two options capture the data well.

To support Hypotheses 2 and 3, we needed to show that employees in different departments interpret the same artifact differently and that this interpretation is aligned with other variables. To compare between the different departments we calculated the percentage of employees in each department in Phase 2 who chose the same response category. Agreement within departments was high: on average 73% of employees in a department interpreted the signs similarly. (A minimum of 50% and a maximum of 100% of employees chose the same sign-interpretation option [same multiple choice response] within each department).

Employees in different departments did not always interpret the sign in the same way, which was evident in variations in the standard deviation of responses between departments within each theme category. The variation of responses regarding *commitment to employee safety and wellbeing* ( $SD = .30$ ) and of

responses regarding *compliance with safety regulations* ( $SD = .27$ ) was compatible with previous studies (e.g., Zohar & Luria, 2005), and indicates that employees of sub-units of the organizations do not completely agree in their perceptions of the safety values.

Hypothesis 2 predicted a positive relationship between employee perceptions of safety signs as indicating commitment and departmental safety-climate scores. In support of this hypothesis we found a positive correlation between the percentage of employees who assessed the artifact (safety sign) as a symbol of *organizational commitment to employee safety and wellbeing* (selected the option related to commitment in the multiple choice questionnaire) and the departmental safety-climate level ( $r = .58$ ,  $p < .05$ ).

Conversely, and also in support of the hypothesis, was the negative correlation between the percentage of employees who interpreted the artifact as a symbol of their *organization's compliance with safety regulations* (selected the option related to compliance in the multiple choice questionnaire) and the departmental safety-climate level score ( $r = -.49$ ,  $p < .10$ ). This suggests that in departments with a high safety climate, that is with a shared perception that safety is a top priority, safety artifacts are interpreted as elements (or signs) of the organizational commitment to employee safety and wellbeing. Where there is a low safety-climate level, safety artifacts are not interpreted as symbols of managerial commitment to safety but rather as indications that the organization is compliant with the law.

Hypothesis 3 specified a positive correlation between the level of transformational leadership in a given department and perceived commitment to safety in artifact interpretation. The results in this case revealed a pattern similar to that observed with the safety-climate variable, but the observed correlations with the leadership scale were not statistically significant. There was positive correlation between the percentage of employees interpreting the safety artifact as a symbol of *organizational commitment to safety* (selected the option related to commitment in the multiple choice questionnaire) and the departmental score in transformational leadership ( $r = .34$ ,  $p > .10$ ). And there was a negative correlation between the percentage of employees reporting the safety artifact to indicate *organizational compliance with safety regulations* (selected the option related to compliance in the multiple choice questionnaire) and the departmental score in transformational leadership ( $r = -.32$ ,  $p > .10$ ).

That these correlations were not statistically significant may be due to the small sample size. Notwithstanding, the pattern of the results does show a clear trend that is similar to the trend found with safety climate (in Hypothesis 2). This trend suggests that employees of departments with a high level of transformational leadership tend to interpret safety artifacts as signs of *organizational commitment* to employee safety and well-being and not as signs of *organizational compliance with safety regulations*. These findings are in alignment with previous reports of a strong correlation between transformational leadership and concern for employee physical and emotional well-being (Zohar & Luria, 2004).

Table 2  
Correlations, means and SD's of all phase 2 study variables

Variable	N	M	SD	1	2	3
1. Safety Climate	12	3.42	.75			
2. Transformational Leadership	12	3.64	.64	.90*		
3. Artifact Interpretation- compliance	22	46%	.20	-.49	-.32	
4. Artifact Interpretation- Commitment	22	44%	.21	.58*	.34	-.47*

Note. \*  $p < .05$ ; \*\*  $p < .01$ .

#### 4. Discussion

The premise of this study was that employees interpret organizational artifacts through the lenses of the basic assumptions, norms, and values of the culture of their work group (their sub-culture). We examined safety signs as organizational artifacts, and found that for most employees these artifacts carried symbolic meanings; employees saw in safety signs a deeper meaning than their obvious functional meaning. This finding is consistent with broader assertions that all organizational artifacts carry both functional and symbolic meanings (Rafaeli & Vilnai-Yavetz, 2004).

Our findings also show that employees' interpretation of safety signs tend to converge into two streams of meanings that represent two foci that organizational safety behavior can take. One stream is of signs representing organizational compliance with safety regulations, a second is of signs representing organizational commitment to employee safety and well being. And these meanings are shown in our data to be associated with the safety climate of the groups: departments in which employees tended to interpret safety signs as indicating commitment to employee safety and wellbeing also tended to have a higher safety climate than departments where employees interpreted signs as representing organization compliance with safety regulations. The relationship between the interpretation of the signs and degree of transformational leadership in a department, although not statistically significant, also suggested a similar pattern.

This study can only be considered as a preliminary study of connecting the concepts of symbolism and cultural artifacts to assessment of safety culture. But the study suggests that through a focus on employee perception and interpretation of organizational safety artifacts, important features of a work group, notably safety climate and extent or genuine commitment to safety can be observed. Further research in this direction is essential toward developing a new methodology for assessing the safety culture of a department or an organization. Our premise is that culture and climate are central agents in organizational safety and in accidents (Zohar & Luria, 2003, 2005), so a tool that provides insight into a safety culture and overcomes response biases and employee resistance, such as the projective tool described here, can provide information that employees and managers might not openly discuss otherwise (Pratt & Rafaeli, 1997).

The projective methodology we describe involves capturing employees' interpretation of safety signs in the actual organizational environment during working hours. Collecting perceptions of the same artifact in multiple departments – like we did – is a vehicle for comparing among different departments. It appears that how an artifact is perceived depends not only on what it clearly says, but also on what the perceiver brings to the interpretation.

The two constructs of "safety culture" and "safety climate" can offer useful insight to managers about the safety perceptions in their organization. The SAI scale offers a tool for assessing assumptions concerning safety among organization members.

Yet this first empirical test of SAI has some limitations. The preliminary results we offer describe only a small sample (201 employees of 22 departments in only three factories), which

limits the types of analyses that we can report and the extent of generalization we can offer. Our results confirm that employees interpret safety artifacts according to their group-level culture. Additional research is needed on larger samples of employees, departments, and organizations.

Moreover, the three participating factories we surveyed agreed to take part in such a demanding safety research, and to dedicate precious working time to allow employees to answer safety questionnaires. Managements of these plants may have a relatively positive attitude towards safety, which may have biased the results. Further research is therefore necessary with a random sample of organizations and especially organizations with low safety commitment (which are harder to recruit). Such research should also seek ways to broaden the source of the data: all variables in this study were obtained from a single source (employees). Although not all variables were measured at the same time, and the SAI was measured with a different (event sampling) methodology, crossing the safety artifact interpretation with more objective measures (e.g., actual accidents) would further validate our claims.

In addition, we can make the following suggestions for improving and developing the Safety Artifact Interpretation (SAI) assessment tool:

- a. *Continuous scale*: Using a continuous scale instead of the multiple choice scale that we used may provide more information and would allow for more elaborate statistical analyses of the perceptions and interpretations of the artifact.
- b. *Wide range of safety artifacts*: We analyzed only one artifact (safety signs). It would be interesting to compare interpretations of different artifacts in the same sub-culture. Additional safety artifacts for future assessments could include safety training manuals, protective gear, or design of machinery parts. The selection of the interpreted artifact should be aligned with the particular organization being studied.
- c. *Managerial interpretation*: We sampled only shop-floor employees in this study. Future research could use the SAI to study managers' conceptions. The alignment between perceptions of managers and employees of the same safety artifact and, more broadly, of the same safety culture would be insightful. For example, Vilnai-Yavetz and Rafeli (2006) noted that managers may suffer from "artifact myopia," or a narrow understanding of the way that an artifact is interpreted. Comparing managerial and employee interpretation can be useful for leadership development and for improving understanding (or misunderstanding) of safety behavior.

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**Gil Luria** is a lecturer at the University of Haifa, the faculty of Social Welfare and Health Sciences at the department of Human Services. He conducts research on safety climate and safety interventions. He received his PhD from the Faculty of Management at the Technion- Israel Institute of Technology. Gil has conducted safety research projects in a variety of organization, from leading manufacturing and military organizations to small factories. These studies were published in scientific and professional journals, and were adopted by practitioners in several organizations as applied tools for safety management. His recent work focuses on the relationship between leadership and safety, and on a new model of Safety Culture as leverage for change. This work, done jointly with Dov Zohar, has won the NIOSH Best Safety Intervention Award in 2003.

**Anat Rafaeli** is a Professor of Organizational Behavior and Chair of the Organization Behavior area of the Faculty of Industrial Engineering and Management of the Technion, in Haifa, Israel. Prior to that she was at the Graduate School of Business of the Hebrew University of Jerusalem, and at The University of Michigan. Her forthcoming book is entitled "*Artifacts and Organizations*" (co-edited with Mike Pratt, Lawrence Erlbaum Associates). Her research analyses various organizational artifacts including employee dress, workstation design, websites and the design of telephone and physical waiting queues on customers. She also studies emotion in organizations and in particular the implications of expression of anger in customer service interactions.