

Sex differences in motion perception of Adler's six great ideas and their opposites

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A mime presented on videotape Adler's six great ideas of truth, goodness, beauty, liberty, equality, and justice; their opposites; and the transitions from the positive or "good" concepts to their opposites. Using Johansson's (1973) technique, the performer's 12 joints were marked with points of light. Overall, the viewers had marginal success in identifying the concepts, but females were much more successful than males in identifying the "bad" ones of evil, slavery, falsehood, and ugliness, averaging 62% correct to the males' 23%. The results agree with Hall's (1984) discussion of sex differences in the interpretation of nonverbal behavior.

Adler (1981) posited six great ideas that have influenced civilization. The ideas are truth, goodness, beauty, liberty, equality, and justice. We wondered whether such ideas might be understood in abstract form through human movement.

We used a technique, pioneered by Johansson (1973), in which points of light are attached to joints of the body. Without movement, the pattern of lights has no particular meaning; with movement, the lights are immediately seen as a human figure in motion (Johansson, 1973). Representative prior research has shown that human infants prefer to look at light patterns from the human body over similar patterns of light with no human reference (Fox & McDaniel, 1982), that male and female walking patterns can be distinguished (Cutting & Proffitt, 1981), that people can recognize their friends by their gaits (Cutting & Kozlowski, 1977), and that the body can project distinct emotions and different dance configurations (Walk & Homan, 1984).

In the present experiment, a mime presented on a videotape her concept of the six great ideas and their opposites. First, the "good" concepts (beauty, equality, goodness, justice, liberty, and truth) were presented. These were followed by their respective opposites (ugliness, inequality, evil, injustice, slavery, and falsehood). Finally, the good concepts were turned into the "bad" ones (beauty to ugliness, equality to inequality, goodness to evil, justice to injustice, liberty to slavery, and truth to falsehood). A different random order was used for each presentation.

METHOD

Subjects

The subjects were 32 students from two laboratory sections in an undergraduate course in experimental psychology. Eleven were males and 21 were females.

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Materials

A videotape was made, showing 18 sequences of behavior. The performer was videotaped wearing a black leotard, with black stockings on her feet and hands and a black pillowcase over her head. Cotton makeup balls were attached with masking tape to the performer's wrists, elbows, shoulders, hips, knees, and ankles. The performer was videotaped against a black background (black cloth taped to the wall and also placed on the floor). The video equipment was a SONY HVC-2800 Trinitron video camera that used Beta tape. When the contrast on the television monitor was turned down, the observers could see only 12 points of light moving on the television screen. Each "concept" or sequence of behavior lasted about 5 to 15 sec, followed by a gap to allow the subjects time to write their responses. The tape lasted a total of 6 min 8 sec, beginning at 3 on the tape counter and ending at 30.

The light sequences are difficult to describe. They must be seen. Tables 1 and 2 are lists of movements that the performer and a viewer, respectively, imagined would help an observer interpret the light movements as representing the concepts. Table 3 lists some general characteristics of positive and negative concepts from the performer's point of view, and Table 4 is a description of the movements of the figure from the point of view of a viewer. Tables 1-3 reflect the viewpoint of the performer, (J.M.F.S., female, a coauthor with 2 years experience as a mime and a degree in experimental psychology); Table 4 represents the viewpoint of the viewer (R.D.W., male, a coauthor who is an experimental and developmental psychologist). The image on the videotape consists of 12 points of light that move in an organized way, which the observer interprets as a figure in motion. No light is reflected from a point or points on the head, yet we refer to the performer as "looking into the future." In Johansson's technique the observer imagines a head that is not there, an example of meaning inferred from the "sound of silence" in perception (Walk, 1984). Anyone interested in this research can send us a blank Beta videotape for a copy of our videotape, *Adler's Six Great Ideas and Their Opposites, in Mime*, by R. D. Walk and J. M. F. Samuel (1986).

The order in which the concepts appear on the videotape and were shown to the subjects is presented below. The time of each sequence, in seconds, is shown in parentheses after the concept. A 10-sec gap followed each sequence, and a 30-sec gap occurred between each type of concept, good concepts first, then bad concepts, then transitions from good concepts to bad.

1. justice (8.5), truth (6.6), equality (7.5), beauty (7.1), liberty (4.0), and goodness (8.8);
2. evil (6.0), injustice (8.7), slavery (8.6), falsehood (7.7), inequality (8.1), and ugliness (9.3);
3. equal to unequal (9.7), liberty to slavery (11.1), good to evil (11.0), justice to injustice (15.0), truth to falsehood (11.4), and beautiful to ugly (11.6).

Procedure

The subjects were handed a response sheet with the following words:

Table 1
The Performer's Description of Movements Representing Positive Concepts, Negative Concepts, and Transitions Between Them

Positive Concepts	
Justice	open, even, rigid, honest.
Truth	open, simple, smooth, relaxed
Equality	simple, symmetric, smooth, relaxed, slow, deliberate
Beauty	smooth, curves, unusual pattern, spacious variety in openness and closedness
Liberty	free, unrestrained movement, open, relaxed, elation, faster pace, projected outward
Goodness	smooth, soft, protective, gentle, rounded, projected inward
Negative Concepts	
Evil	erratic, devious, turned away, cut off from environment, contracted, oblique movements
Injustice	rigid, preference for one side, oblique, unbalanced
Slavery	powerless, at the mercy of outside power, pulled by external force, oblique, tense
Falsehood	erratic, unpredictable, angular, pulled in or contracted, hesitant, uneven, asymmetrical
Inequality	static, asymmetry, closed to environment
Ugliness	weak, asymmetrical, shapeless, unclear, erratic, like jelly
Transitions	
Equal to Unequal	simple symmetry to asymmetry
Liberty to Slavery	source of power moving from inside to outside of body, activity level diminishes
Good to Evil	open, rounded movements changing to jagged, closed, oppressive movements
Justice to Injustice	simple symmetry sliding into powerless disequilibrium
Truth to Falsehood	open, upward movement changes to closed, downward position
Beautiful to Ugly	simple, smooth, open, slow movements changed to jagged, contracted, faster movements

You will be shown abstract concepts represented in points of light as expressed by the body movement of a mime. You will be shown the concepts shown to the right (in alphabetical order), and your task is to write down the concept that you think is expressed each time. You will note that the first showing is of "good" concepts, the second one of "bad" concepts, and the third one of the "good" concepts turning into "bad" ones.

The response sheet was divided into three groups of six trials, each numbered from 1 to 6. The groups were labeled "first showing," "second showing," and "third showing." Each group of concepts was in alphabetical order. To ensure that the subjects understood their task, the experimenter read the instructions aloud while the subjects followed the script. An informal question-and-answer period followed. The subjects were asked to write down a guess on every trial, even if they were not sure what to write.

RESULTS

In discriminating the concepts, 72% of subjects (54% of the males and 81% of the females) were above the

chance level of 3 correct responses of 18. For the entire sample, this is highly significant [$t(31) = 4.284, p < .001$], but when broken down by gender, significant only for females [$t(20) = 4.488, p < .001$], not for males [$t(10) = 1.218, \text{n.s.}$].

The subjects were most successful in identifying the bad concepts (34% overall), followed by the transitions from good to bad (29% correct). They were least successful with the good concepts (20% correct). Chance, of course, is 17% correct. A repeated measures analysis of variance revealed a significant difference between subjects' recognition of concepts [$F(2,62) = 4.69, p < .02$]. The Newman-Keuls test showed that the only significance between subjects' recognition of concepts was that between good and bad concepts ($p < .01$). These results are shown in Table 5.

Table 2
The Viewer's Description of Movements Representing Positive Concepts, Negative Concepts, and Transitions Between Them

Positive	
Justice	symmetry coming into equilibrium, balancing out
Truth	dancing movement, relaxed and open, coming to rest
Equality	simple, symmetrical movement, upward and then down, like taking a deep breath, controlled
Beauty	many gentle curves ending in a protective curved position, upward open, then down
Liberty	jumping, happy, subdued at end
Goodness	beginning ominous, becoming softer and friendlier, protective in the end, rounded movements
Negative	
Evil	devious, asymmetrical, jagged movements, conniving
Injustice	movement pattern out of balance on top part, base is steady
Slavery	frightened, being pulled against one's will, weak
Falsehood	playful, nasty, erratic, frivolous
Inequality	quiet asymmetrical pattern comes to rest, loses balance at end
Ugliness	being displeased, hiding, turning into oneself, indecisive
Transitions	
Equal to Unequal	inward symmetrical movement gently changes to asymmetrical pattern
Liberty to Slavery	happy, fast, open movements change to hesitant, dependent, weak poses
Good to Evil	smooth, round movements change to jagged, teasing, irritating movements
Justice to Injustice	visual equilibrium gets established and slowly slides to permanent imbalance, weak
Truth to Falsehood	being in awe and open changes to being frightened and closed. Upward to downward, simple to complicated
Beautiful to Ugly	gentle human movements to small, tight, mechanical movements downward. Gentleness to unpredictable jaggedness

Table 3
General Movement Characteristics of Positive and Negative Concepts (Performer's Point of View)

Positive Concepts	Negative Concepts
Horizontal, vertical	Oblique
Symmetry	Asymmetry
Incorporates outside space, open to environment	Retracting from space around, closed to environment and others
Slower	Faster
Organized	Erratic
Smooth	Jagged
Relaxed	Tense
Round	Angular
Directed upward	Directed downward
Control	Out of control
Upward, out	Downward, in

Table 4
Outside, Objective View of Performer's Portrayal of Positive and Negative Concepts

Positive Concepts	
Justice	arms extended straight out to side, performer slightly squatting, knees symmetrically flexed, horizontal arms tilt up and down, end horizontal, balanced
Truth	performer first makes circular motion with both arms and hands, body straight, erect, "looking to future," right arm large circular motion, slight crouch while looking into distance, right arm horizontal, left at 45° upward
Equality	stands straight, arms out to side and straight up over head, arms down, elbows forward toward camera, stops, compact frontal view of body
Beauty	symmetrical movements, ends with body inclined to left, kneeling slightly, with arms up
Liberty	leaps up and down, symmetrically facing forward, ends with inverted "V" shape
Goodness	faced forward, body does irregular movement, arms slant out, finished tucked near waist, much like "beauty" except more rotational movement of hands
Negative Concepts	
Evil	faced forward, body then makes irregular twisting movements, ends in left oblique
Injustice	like depiction of "justice" except that outstretched arms aslant or unbalanced at end
Slavery	body weaves back and forth, crouched, arms outstretched as if being pulled by rope (chains?) toward left
Falsehood	faced forward, body tight and close in, close irregular movements up and down with knees, body to left but shoulders and head forward
Inequality	faced forward, erect, close in up and down movements of hands and feet, ends with one foot up, one arm higher than the other
Ugliness	body asymmetrical, leans to left, sinuous, snakelike movements as body slowly twists downward, ends in compact crouch, head down

The individual concepts and the subjects' guesses are shown in Table 6. The concepts identified correctly most often were slavery (72%), the transition from liberty to slavery (63%), beauty (53%), and evil (53%). All justice-injustice presentations were confused with equality-inequality. Justice was misidentified as equality by 81%

of the subjects, injustice called inequality by 91% of the subjects, and the transition from justice to injustice called the transition from equality to inequality by 84% of the subjects. Of course, for this type of experiment, in which abstract meanings of nonverbal behavior are explored, one can argue that the subjects were "correct" and we were not.

Overall, the females averaged 32% correct and the males 21% (chance = 17% correct). The overall male-female difference approaches, but does not quite reach, significance [$t(30) = 1.932, p < .10$]. In identifying the bad concepts, however, the females were superior to the males, averaging 43% correct to 17%, meaning that the males were at a chance level. This difference is highly significant [$t(30) = 3.481, p < .01$]. If one eliminates injustice and inequality, confused by almost all subjects, then females averaged 62% on the remaining four bad concepts of evil, slavery, falsehood, and ugliness, whereas males averaged 23% correct. This is a very significant sex difference [$t(30) = 4.272, p < .001$]. The performer is female, and our research seems to have uncovered a secret body language understood by females and not by males.

DISCUSSION

Our attempt to find body movements expressive of the abstract concepts of Adler's six great ideas of truth, goodness, beauty, liberty, equality, and justice had limited success. If one changes the meaning of our depiction of justice to equality and retains the interpretation of beauty as a concept, then we have two possible "great idea" concepts expressed as body movement. The depictions of the negative opposites of some of Adler's great ideas—falsehood, evil, ugliness, and slavery—were identified more successfully, but only among females. By reinterpreting the meaning of inequality as injustice, five of our six depictions of negative concepts may be interpretable by some subjects. This is not the way the experiment was planned, but we have shown that bodily movement can convey some abstract concepts.

The most impressive finding of the experiment was the sex difference: women were far superior to men in decoding the negative concepts of falsehood, evil, ugliness, and slavery. Hall's (1984) review of sex differences in the decoding of nonverbal behavior generally shows that women are superior to men. Hall's review also shows that women are superior to men in decoding negative concepts, so our results agree with hers.

Our studies also indicate the importance of the performer. An earlier study of ours (Walk & Homan, 1984) found that women are superior to men in decoding bodily movements expressive of emotion and dance,

Table 5
Discrimination of Concepts by Type of Concept and Sex Differences

	Type of Concept			
	Good	Bad	Good to Bad	Total
	Total Sample			
Mean correct	1.22	2.06	1.75	5.03
Percent correct	20%	34%	29%	28%
	Males			
Mean correct	1.00	1.00	1.82	3.82
Percent correct	17%	17%	30%	21%
	Females			
Mean correct	1.33	2.57	1.71	5.67
Percent correct	22%	43%	29%	32%

Table 6
**Six Great Ideas in Mime: The Relation Between the Stimulus
 Presented and the Subjects' Guesses**

Presented	Guessed					
	Beauty	Equality	Goodness	Justice	Liberty	Truth
Beauty	53%	—	3%	6%	19%	19%
Equality	6%	6%	31%	28%	6%	22%
Goodness	16%	3%	16%	22%	22%	22%
Justice	—	81%	3%	13%	3%	—
Liberty	13%	9%	38%	13%	13%	16%
Truth	13%	—	6%	16%	41%	22%

	Ugliness	Inequality	Evil	Injustice	Slavery	Falsehood
Ugliness	38%	—	13%	16%	6%	28%
Inequality	34%	6%	9%	16%	9%	25%
Evil	3%	—	53%	16%	16%	9%
Injustice	3%	91%	—	6%	—	—
Slavery	3%	6%	—	13%	72%	6%
Falsehood	16%	—	22%	28%	3%	31%

	Beautiful to Ugly	Equal to Inequal	Good to Evil	Just to Injust	Liberty to Slavery	Truth to Falsehood
Beautiful to Ugly	28%	13%	25%	9%	—	25%
Equal to Inequal	25%	3%	6%	31%	9%	22%
Good to Evil	28%	—	34%	6%	13%	16%
Just to Injust	—	84%	3%	9%	3%	—
Liberty to Slavery	3%	—	13%	19%	63%	3%
Truth to Falsehood	16%	3%	9%	19%	13%	38%

Note—Wording of transitions has been shortened.

but the difference in that study, although statistically significant, was not large (68% correct for women and 58% for men). Walk and Homan's study had two performers, both women, and the present study used the mime who interpreted emotions in Walk and Homan's study. An unpublished study by Walk and Walters (1985) had several different performers, three females and one male, interpreting the emotions of anger, disgust, fear, happiness, sadness, and surprise, and the only significant sex difference was that movements by the male performer were identified correctly 82% of the time by male subjects and 61% of the time by female subjects. Thus, we agree with LaFrance (1986) that the sex of the performer may be important.

Our experiment reports probably as large a difference between the sexes in interpreting nonverbal behavior as any previously found. Tables 1-4, perhaps used in conjunction with our videotape, may lead to research to understand the stimulus basis for the difference. Our hope is that a difference as large as the one we have reported will lead to further research to understand sex differences in decoding nonverbal behavior.

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