The Psychology of Social Impact

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ABSTRACT: The author proposes a theory of social impact specifying the effect of other persons on an individual. According to the theory, when other people are the source of impact and the individual is the target, impact should be a multiplicative function of the strength, immediacy, and number of other people. Furthermore, impact should take the form of a power function, with the marginal effect of the Nth other person being less than that of the (N - 1)th. Finally, when other people stand with the individual as the target of forces from outside the group, impact should be divided such that the resultant is an inverse power function of the strength, immediacy, and number of persons standing together. The author reviews relevant evidence from research on conformity and imitation, stage fright and embarrassment, news interest, bystander intervention, tipping, inquiring for Christ, productivity in groups, and crowding in rats. He also discusses the unresolved issues and desirable characteristics of the theory.

People affect each other in many different ways. As social animals, we are drawn by the attractiveness of others and aroused by their mere presence, stimulated by their activity and embarrassed by their attention. We are influenced by the actions of others, entertained by their performances, and sometimes persuaded by their arguments. We are inhibited by the surveillance of others and made less guilty by their complicity. We are threatened by the power of others and angered by their attack. Fortunately, we are also comforted by the support of others and sustained by their love.

I call all these effects, and others like them, “social impact.” By social impact, I mean any of the great variety of changes in physiological states and subjective feelings, motives and emotions, cognitions and beliefs, values and behavior, that occur in an individual, human or animal, as a result of the real, implied, or imagined presence or actions of other individuals.

Clearly, this is a rather broad definition.

In the present article I offer a general theory of social impact. Depending on one’s philosophy of science, one may wish rather to regard the theory as a quantitative description, an empirical generalization, a discovery, a set of fundamental laws, a model, an organizing theme, a framework, or a perspective. In any event, the theory is not itself very specific. It does not say when social impact will occur or detail the exact mechanisms whereby social impact is transmitted. It does not purport to “explain” the operation of any of the number of particular social processes that are necessary to account for all the effects I have labeled “social impact” or to substitute for theories that do. It does, however, provide general overall rules that seem to govern each and all of these individual processes. The theory consists of three principles that represent an attempt to adapt, integrate, and formalize ideas initially developed by sociologist Stewart Dodd, astronomer J. Q. Stewart, anthropologist-geographer-linguist George Kingsley Zipf, and psychologists Kurt Lewin and S. S. Stevens, among others. Although the principles comprise a general theory, they lead to specific quantifiable and verifiable predictions. In the remainder of this article, I develop the theory and briefly review evidence from ten areas of application.

Three Principles of Social Impact

To start I suggest that one can usefully think of social impact as being the result of social forces (like the physical forces of light, sound, gravity,
and magnetism) operating in a social force field or social structure. As an example of what I mean by a social force field, Figure 1 depicts the plight of a hapless striped target beset by a variety of spotted sources, all having some impact.

**Principle 1: Social Forces,** \( I = f(SIN) \)

As a first principle, I suggest that when some number of social sources are acting on a target individual, the amount of impact experienced by the target should be a multiplicative function of the strength, \( S \), the immediacy, \( I \), and the number, \( N \), of sources present. By strength, I mean the salience, power, importance, or intensity of a given source to the target—usually this would be determined by such things as the source's status, age, socioeconomic status, and prior relationship with, or future power over, the target. By immediacy, I mean closeness in space or time and absence of intervening barriers or filters. By number, I mean how many people there are.

This can be called a light bulb theory of social relations: As the amount of light falling on a surface is a multiplicative function of the wattage or intensity of the light bulbs shining on the surface, their closeness to the surface, and the number of bulbs, so the impact experienced by an individual is a multiplicative function of the strength, immediacy, and number of people affecting him or her. It seems reasonable to expect that an individual will experience more impact the higher the status, the more immediate the influence, and the greater the number of other people affecting him or her, and data typically bear this out. In general, I am suggesting that the laws governing the intensity of a social flux are comparable to the laws governing the intensity of a luminous flux.

I concentrate on the number dimension here because this is the dimension for which there are the most data. The line of thought I shall pursue, however, is also translatable into the other dimensions, and I do not mean to imply that number is more important than strength or immediacy in moderating impact.

**Principle 2: The Psychosocial Law,** \( I = sN^t \), \( t < 1 \)

Any economist will tell you that the first dollar you have, devalued as it might be, is worth more than the hundredth. Likewise, I think, the first other person in a social force field should have greater impact than the hundredth. This is not to say that one wouldn't rather have $100 than $1 or that 100 people won't have more impact than a single person but that the difference between 99 and 100 is less than the difference between 0 and 1. Thus, I suggest, there is a marginally decreasing effect of increased supplies of people as well as of money.

From Fechner's day, psychologists have studied similar relationships between objective and subjective reality, between external value and internal valuation, under the rubric of "psychophysics." In 1957, S. S. Stevens distilled all this activity into an elegant but simple law: \( \psi = k\phi^\beta \). For prosthetic stimulus dimensions (in which qualities vary in intensity), the subjective psychological intensity, \( \psi \), equals some power, \( \beta \), of the objective physical intensity of the stimulus, \( \phi \), times a scaling constant, \( k \).

I would like to suggest my own psychosocial law to parallel Stevens's psychophysical law: \( I = sN^t \). When people are in a multiplicative force field, the amount of social impact, \( I \), they experience will equal some power, \( t \), of the number of sources, \( N \), times a scaling constant, \( s \). Further, the value of the exponent \( t \) should be less than one: Impact will increase in proportion to some root of the number of people present.

My task in this article is to convince you that SIN has a special role in psychology and that \( I = sN^t \) is.

**APPLICATION 1: CONFORMITY AND IMITATION**

Eighty years of experimental evidence strongly shows that individuals are influenced by the actions
and expectations of others. These effects have long been studied under such rubrics as allelomimetic behavior, behavioral contagion, conformity, compliance, group pressure, imitation, normative influence, observational learning, social facilitation, suggestion, and vicarious conditioning. In general, the theory of social impact suggests that each of these kinds of influence can be understood as resulting from the operation of social forces in a multiplicative force field: Increases in the strength, immediacy, and number of people who are the source of influence should lead to increases in their effect on an individual. In this section, I discuss research on conformity, which presents only mixed support for the principles of social impact.

Asch and the magic number three. Ironically, some of the first and most famous research involving parametric variations in the number of people serving as the source of social impact appears to suggest a relationship quite different from that proposed here. In his classic studies on independence and conformity Asch (1951, 1952, 1956) asked Swarthmore College students to choose which of a set of three disparate lines matched a standard, either alone or after 1, 2, 3, 4, 8, or 16 confederates had first given a unanimously incorrect answer. Figure 2a shows the percentage of trials on which participants overruled their own senses and conformed to majority judgment. In discussing the implications of these data, Asch focused on the concept of group "consensus," concluding that increasing group size leads to increased conformity only to the point, 3, where there is a perception of consensus among group members.

Although the most striking feature of Asch’s data is that conformity does not seem to increase with increases in group size beyond three members, the most troubling aspect for social impact theory is that people faced with but one or two incorrect conformers conformed so little—in the present theory, the first person added to a social setting is expected to have the most impact. However, for such counterfactual judgments, Swarthmore students may be sufficiently independent as to require a substantial amount of social pressure just to bring them up to a yielding threshold; the first one or two incorrect models may in fact reduce restraints, making it possible for the addition of further confederates to have a more visible effect.

In a replication by Gerard, Wilhelmy, and Conolley (1968) 154 high school students (who might not have had so much initial resistance to making counterfactual judgments) were exposed to one to seven confederates giving incorrect answers. Gerard et al. expected and found conformity to increase with group size. Furthermore, the first few confederates had the most impact. Figure 2b presents their data (circles) and the best fitting power function (dashed line) calculated from the formula \( I = sN^p \), which does a good job in fitting these data, accounting for 80% of the variance in means (better than the 61% best linear fit). In this case, the exponent is .46: Conformity seems to grow in proportion to the square root of majority size.

Craning and gawking. Milgram, Bickman, and

Figure 2. Conformity and imitation as a function of a group size: a. Data from Asch (1951); b. Data from Gerard, Wilhelmy, and Conolley (1968); c. Data from Milgram, Bickman, and Berkowitz (1969).
Berkowitz (1969) conducted an interesting experiment at the Graduate Center of the City University of New York, where the laboratory facilities include 42nd Street. Confederates in groups ranging in size from 1 to 15 would stop, congregate, and crane their necks, gawking up at a window on the sixth floor, behind which, dimly visible, stood Stanley Milgram taking movies. These movies were later analyzed to see how many passersby were stimulated themselves to crane and gawk. Increasing the number of confederates craning and gawking led to an increase in the number of passersby craning and gawking, but the additional craning and gawking caused by each additional cramer and gawker grew smaller with increasing numbers of confederates. The fit between the data (circles in Figure 2c) and the best fitting power function (dotted line in Figure 2c) is again impressive, with the squared correlation coefficient indicating that the power law accounts for 90% of the variance in the percentage of passersby imitating. The exponent of .24 is less than one, as predicted, and craning and gawking is proportional to the fourth root of the number of cranners and gawkers. On balance, research on conformity and imitation appears to support the general principles of social impact.

APPLICATION 2: THE SOCIAL PSYCHOPHYSICS OF EMBARRASSMENT

Although many of us have been exposed to the embarrassing or even debilitating experience of performing in front of an audience, the mechanism that mediates stage fright or performance apprehension is not at all well understood. In a study directly designed to provide exact tests of the relationships between audience size and strength and social impact, Latané and Harkins (1976) investigated anticipated stage fright using a technique borrowed from sensory psychophysics: cross-modality matching.

Sixteen college students tested individually in a soundproof booth were asked to imagine that they had memorized a poem and were to recite it in front of an audience. By pushing buttons, they could adjust the brightness of a translucent screen or the loudness of a tone to match their anticipated level of social tension about performing in front of audiences varying in size and status. They were asked to make the tone as loud or the screen as bright as they would be anxious, nervous, or tense. “Audiences” consisted of 1, 2, 4, 8, or 16 faces of persons, either all males or all females and either in their early teens or late thirties.

We predicted that (a) audience size and tension would be related by a power function with an exponent of less than one, (b) audiences composed of older, higher status people would engender more tension, and (c) since it was postulated that audience size and status would be multiplicatively related, there would be greater differences for larger audiences.

One of the elegant features of a power law is that simply by taking the logarithms of both sides of the equation \( I = sN^b \), one obtains the equation \( \log I = \log s + t(\log N) \), which has the form \( x = a + by \), the formula for a straight line. This means that power functions are linear in logarithmic coordinates, allowing one to derive precise estimates of parameters and to make exact tests of predictions using standard regression and analysis of variance techniques after subjecting the data to logarithmic transformation.

As audience size increased, participants matched their subjective tension with increasing brightness and loudness of tone \( (\omega^2 = 60\%) \). The linear components accounted for 98% of the variance attributable to audience size, and deviations from linearity (i.e., deviations from a power function) were not significant. The slope of the linear trend for loudness, and therefore the exponent of the power function implied by it, was .99. Since in cross-modality matching this exponent should represent the ratio of the exponent for effect of audience size and the exponent for loudness, and since preliminary research showed the exponent for loudness in this setting to be .52, this result implies that the exponent for the effect of audience size on rated tension is also about .52, less than one, as expected. It appears that subjective tension in this situation grows in proportion to the square root of the number of people in the audience. Participants generated a similar exponent of .60 for their brightness matches.

In addition, audiences in their late thirties engendered more anxiety than audiences in their early teens \( (\omega^2 = 14\%) \), and male audiences elicited more tension than did female audiences \( (\omega^2 = 3\%) \). There were no interactions between age or sex and audience size. Since age and audience size did not interact, the main effects for these variables, expressed in logarithmic units, imply an additive relationship. However, adding logarithms is the same as multiplying the antilogarithms, and thus the data confirm the hypothesis that impact is a simple multiplicative function of status and number. This multiplicative relationship results in there being greater differences due to age and status for the larger audience sizes. Figure 3a displays this mult-
tiplicative relationship for the brightness matches; the comparable relationship for loudness is very similar.

It is probably no surprise to psychologists familiar with cross-modality matching that people can do a good job on these tasks, but we were impressed by the remarkable ease and confidence with which our participants made these unusual comparisons. Not only were they able to equate such disparate commodities as nervousness, loudness, and brightness, but they did so in an impressively lawful manner. These results are based on subjective estimates about reactions to imagined situations, making them potentially responsive to such sources of bias as experimenter demand. Although cross-modality matching does not preclude expectations as to the existence or direction of effects, the complexity of the procedure would seem to make it unlikely that participants were merely responding to demand characteristics with respect to the shape of the functions. That we found the same functions and approximately the same exponent whether volunteers adjusted loudness or brightness increases our confidence that both results reflect the same underlying relationship.

Results of an experiment on stuttering reported by Porter (1939) provide evidence that the relationship we found between stage fright and audience size may also hold in situations involving natural behavior and real audiences. In Porter’s experiment, 10 male and 3 female stutterers attending remedial speech courses at the University of Iowa were asked to read 500-word passages in front of audiences consisting of 0, 1, 2, 4, or 8 members. Since as audience size increased, stutterers were presumably faced with increasing social tension, we would expect stuttering to increase as a power function with an exponent of less than one. In fact, our reanalysis shows that Porter’s data (open circles in Figure 3b) are well fit ($r^2 = .90$) by a power function of audience size with an exponent of less than one. Stuttering appears to grow in proportion to the cube root of audience size.

APPLICATION 3: SOCIAL IMPACT OF NEWS EVENTS

Newspapers serve as a major source of information and as a topic for conversation: They help determine the content of our mental lives. However, not everything that happens gets printed in the newspaper, and not all that is printed is read or remembered. Obviously, a great many factors determine the interest value of news events—their rarity, their consequence, the extent to which they

Figure 3. Social tension as a function of audience size: a. Data on matched brightness (footlamberts$^4$) from Latané and Harkins (1976); b. Data on stuttering from Porter (1939).
relate to our needs and aspirations. The theory of social impact suggests that among these determinants should be the strength, immediacy, and number of people involved.

In one of a series of studies, Bassett and Latané (Note 1) varied the status, the distance, and the number of others involved in catastrophes, asking 86 introductory psychology students to play the role of campus newspaper editors and recommend the amount of coverage (in newspaper column inches) to allocate to each story. At a single mass administration, each “editor” was given a booklet that contained 20 headlines about either a fire (e.g., “14 Professors Hospitalized After a Fire in Arizona State Lounge”) or a bomb (“Bomb Disrupts Columbus Meeting of Business Leaders: Two Killed”), in which the status of those involved (secretaries or union members vs. professors or business leaders) and the distance of the event (Columbus or Arizona) were covaried with the number of people involved (0, 2, 5, 9, 14, 27, or 54). Before the editors made their decisions, they were shown samples of news stories of various lengths (2, 12, or 28 inches) to guide their decisions and were told to assume there was enough material for each story to be as long as they desired. Formally, this task can be considered an example of magnitude estimation or cross-modality matching, since participants were given the opportunity to adjust one dimension, column inches, to match another, news value. Such a procedure should provide ratio scaling of news interest.

Analyses of the data in logarithmic units indicated that the column inches assigned to news stories increased as a power function ($r^2 = .99$) of the number of persons involved with an exponent of about .5, which did not vary as a function of experimental condition. The interest value of news events seems to grow in proportion to the square root of the number of people involved. The severity of the event (bomb vs. fire) and the distance from Columbus also had strong main effects, but they did not interact in logarithmic units with the number of people involved. Again, this implies multiplicative relationships in normal units, as can be seen in Figure 4, which indicates that the difference in judged news value between the nearby (Columbus) and faraway (Phoenix) events grows larger the greater the number of people involved.

Status, in the present experiment, had no effect: Students considered it no more newsworthy for professors than secretaries to be hospitalized or for business leaders than union members to be bombed. Although separate manipulation checks did indicate that students do regard professors and business leaders as having higher status and the test was sufficiently powerful to detect moderate effects, it is not clear whether this failure to find a difference represents a general exception to the theory or simply the operation of some factor related to catastrophes. For example, the idea that death is the great equalizer may be true in a new sense.

Evidence for the latter view comes from a second experiment in which participants rated the news interest value of two noncatastrophes: (a) “Fourteen (Fifty-Four) Minneapolis (Columbus) High School Students (Political Figures) Stage Unicycle Race for Charities” and (b) “Five (Twenty-Seventy) University of Minnesota (Ohio State University) Nursing Students (Medical Students) Expelled in Cheating Scandal.” This time, all three variables, status included, had very strong main effects. Again, there were no interactions in the logarithmic units, implying simple multiplicative relationships.

Principle 3: Multiplication Versus Division of Impact

In addition to force fields in which a given individual is the target of social forces and experiences
impact as a multiplicative function of the strength, immediacy, and number of sources, I now suggest that there exists a different type of force field or social structure in which other people stand with the individual as the target of forces coming from outside the group. In such situations, schematized in Figure 5, I suggest that increasing the strength, immediacy, or number of other targets should lead to a division or diminution of impact, with each person feeling less than he or she would if alone. For example, consider a person giving a speech. As the target of social forces emanating from each member of the audience and the object of their attention, he or she is in a multiplicative force field and should feel greater tension the larger the audience. Members of the audience, on the other hand, stand, or rather sit, together as the target of forces coming from the speaker. Unfortunately, the impact of the speaker’s arguments is probably divided, and the larger the audience, the less each member will be persuaded.

Consistent with my earlier arguments about marginal impact, I suggest that the psychosocial law still applies in divisive force fields and that the effect of a social force from outside the group is divided not by the actual number of people present, but by some root of that number, with \( I = \frac{s}{N^{r}} \). This is mathematically equivalent to \( I = sN^{-r} \), making the formula the same as in the case of multiplicative social structures but with the sign of the exponent changed. Thus, according to social impact theory, the exponent of \( t \) in divisive social structures should be negative with an absolute value of less than one.

**APPLICATION 4: SOCIAL INHIBITION OF EMERGENCY RESPONSE**

The present theory grew out of a program of research with John Darley on bystander intervention in emergencies (Latané & Darley, 1970). One might recall that one of several processes we postulated to explain our finding that people are less likely to intervene if they believe other people are also available to respond was diffusion of responsibility—if others are present, the responsibility for intervention is psychologically diffused or divided among them, leaving each person less motivated to act. I suggest now that this process is more general and can lead to the diffusion or division of other social forces.

The discovery of the social inhibition of bystander intervention has been widely replicated: Latané and Nida (1981) cite 56 published comparisons of helping by people who were alone with helping by those who were tested in the presence of confederates or believed other people to be present. In 48 of these 56 comparisons, involving a total of more than 2,000 people, there was less helping in the group condition. Overall, three quarters of individuals tested alone helped; only half of those tested with others did so. Further, in 31 of an additional 37 comparisons between persons tested alone and actual groups of 2–8 people, the effective individual probability of helping was less than the alone response rate, while in 4 others, the comparison was indeterminate. About half of the 2,028 individuals tested alone in these studies helped, whereas the effective individual response rate for the more than 1,600 people tested in groups was only 22%. Clearly, social inhibition occurs in both laboratory and field settings employing a wide variety of emergencies designed by a multitude of independent investigators.

According to the psychosocial law, the biggest increment in social inhibition should occur with the addition of the first other bystander; subsequent ones should have decreasing marginal impact. In fact, the results of the original Darley and Latané (1968) experiment bear out this expectation. In that experiment, speed of helping decreased in proportion to the cube root of the number of bystanders believed to be present.

**APPLICATION 5: A KNOCK ON THE DOOR, A POWER FAILURE, AND A REQUEST FOR HELP**

In order to test the effect of group size over several levels, Freeman (1974) asked 294 introductory psy-
psychology students at Ohio State to participate in an experiment "to help us pretest some materials for an experiment." Arriving in the laboratory alone, in pairs, in groups of four, or in groups of eight, participants sat in a room and watched slides.

Six minutes after the experimenter left the room, there was a series of knocks on the door. If there was no response within 10 seconds, the knocks were repeated. Participants had to decide whether to answer the door. Approximately five minutes later, all electricity was cut off from the experimental room and hallway, preventing all of them from continuing their task and leaving them in a pitch black room. Participants could then choose whether or not to leave the room. Finally, the experimenters started to move some boxes, and participants had to decide whether or not to help.

According to the results, if one needs help with some boxes or would like to have a power failure reported, one is no more likely to be obliged if eight people are available to respond than if only one or two are, and when it comes to simply knocking on the door, one actually has only half the chance of getting a response. This comparison, however informative it may be as to one's chances of eliciting a response, does not provide a true picture of the effects of the presence of other people on an individual's response rate, since there were differing numbers of people available to respond. It is meaningless to compare directly individual with group responses, since with differing numbers of people available to respond there is a purely mechanical potential for getting more help with more people. However, one can use the obtained group response rate to calculate the effective individual probability of response under the null hypothesis that being in a group has no effects. The formula can easily be derived from a simple binomial, independent-trials model: 

$$P_e = 1 - (1 - P_C)^n$$

where $P_e$ is the estimated effective individual probability of response, $P_C$ is the obtained proportion of groups responding, and $n$ is the size of the group. This formula makes it possible to compare effective individual rates across conditions involving groups of different sizes.

Figure 6a displays the results of Freeman's (1974) study. With the exception of a single inversion, the effective individual probability of response declines consistently, substantially, and significantly as group size increases. Analysis of speed scores based on the response latencies shows that the addition of the second person in these groups had an effect 8 times greater than that produced by the addition of the third or fourth person and 23 times greater than that produced by the addition of the fifth, sixth, seventh, or eighth person, supporting the prediction of decreasing marginal effect. Finally, there were no effects related to sex or to interactions of sex with group size. Social inhibition effects were equally as pronounced for male as for female subjects.

Latané and Darley (1968, 1970, 1975) suggest several theoretical processes which, separately or in combination, may account for social inhibition effects. These include diffusion of responsibility from the knowledge that other people are also available to respond, embarrassment from knowing that other people may watch one make a fool of oneself, and social influence from seeing that other people are not responding. The present results can be interpreted in terms of diffusion of responsibility, with one to eight individuals standing as the target of needs for action caused by the door knock, power failure, or request for help. Although social inhibition may have also derived partially from processes related to social influence or embarrassment, in the power failure situation at least, the effect of these processes should have been reduced by the fact that individuals could not see or be seen by each other in the darkness.

APPLICATION 6: CHIVALRY IN ELEVATORS

In this and the next two sections I briefly describe three field studies which are consistent with the proposition that in social structures in which many people stand together as the target of forces from a single source, impact will be an inverse power function of the number of people with an exponent of less than one.

Figure 6b shows data reported by Latané and Dabbs (1975) and includes the responses of almost 5,000 elevator passengers in Atlanta, Columbus, and Seattle who were exposed to one of about 1,500 occasions on which a fellow passenger "accidentally" dropped a handful of pencils or coins. In addition to our primary interest in regional differences in sex role differentiation, we found highly significant group size effects: As the number of people available to respond increased from one to six, the individual probability of response decreased from 40% to 15%. This systematic decrease can best be described by an inverse power function with an exponent of about .5. Although there were big differences between the sexes in the overall likelihood of helping, the effect of other people was similar for both sexes—helping to pick up ob-
jects decreased in proportion to the square root of the number of people available to pick up objects. The impact of the need for help shown by the clumsy coin dropper was seemingly divided among those who were the target of this need.

I might put in a parenthetical plug for the utility of elevators as portable psychological laboratories (see also Petty, Williams, Harkins, & Latané, 1977). Never cluttered up with surplus equipment or old data sheets, always available for scheduling, they generate a steady stream of subjects who come inside of their own volition and, once there, act with no more than their normal paranoia. Far more representative of the general population than the typical college sophomore, elevator passengers are far less suspicious or anxious to do the right thing for science. And unlike other public places, elevators are self-contained with clearly defined boundaries, so one knows exactly who is present and who is not.

APPLICATION 7: TIPPING IN RESTAURANTS

The custom of tipping—leaving some money for the waiter after one has finished a meal—is interesting for several reasons. Unlike most other economic transactions, it is at least partly voluntary.
Although most waiters have the reasonable expectation that one will leave a tip, whether one does and how much one leaves are personal choices. Unlike one's obligation to the restaurant owner for the price of the meal, one cannot go to jail or be forced to wash dishes if one chooses not to tip.

Reasoning that a primary motive for leaving a tip is a feeling of responsibility or obligation to the waiter, and that this feeling of obligation should be diffused or divided to the extent that several people eat together on the same bill, Freeman, Walker, Borden, and Latane (1975) enlisted the cooperation of 11 waiters, unfamiliar with the theory, who unobtrusively recorded size of party, amount of bill, and size of tip for 408 groups of 1,159 evening diners at the Steak and Ale Restaurant in Columbus, Ohio. Twelve parties had more than 6 members and were excluded from analysis, since they required special services; the remaining 396 parties consisted of an average of 2.67 people, who were billed an average of $6.95 per person and tipped an average of $1.00 per person.

Although the best linear prediction of tip from bill was 15.02% minus .09 cents, indicating rather close adherence to a 15% norm, group size also made a major contribution to tipping. As seen in Figure 6c, individuals dining alone tipped almost 19%, while groups of five to six people tipped less than 13%. This systematic decrease can best be described by an inverse power function with an exponent of about .3: Tipping seems to decrease in proportion to the fifth root of the number of people eating together. The impact of the responsibility for giving money to the waiter was seemingly divided among those who were the target of this responsibility.

This result has considerable practical significance. Americans spend about $30 billion a year in eating out and probably leave about $2 or $3 billion a year in tips, accounting for two thirds of the total income of the more than one million waiters in the United States. This result suggests, although it does not prove, that waiters might be far better off if they were a little more willing to write separate checks for large parties—this might short-circuit diffusion of responsibility and result in larger tips.

APPLICATION 8: INQUIRING FOR CHRIST

An unpublished experiment that has not perished is the classic study by Ringelmann, reported only in summary form by Moede (1927) in German but cited and analyzed by many later scientists. In that experiment, the collective group performance of co-workers pulling on a rope was less than the sum...
of their individual performances, with dyads pulling at 93% of their individual capability, trios at 85%, and groups of eight at only 49%. As the old saw has it, "Many hands make light the work."

In a recently published replication (Latané, Williams, & Harkins, 1979), groups of six undergraduate males gathered in Ohio Stadium and were asked to make as much noise as possible by shouting or clapping hands alone, in pairs, or in groups of six. As in pulling ropes, it appears that when it comes to clapping or even shouting out loud, many hands do in fact make light the work: Even though total output increased with group size, the output of each member decreased, with six-person groups performing at only 36% of capacity (see Figure 7, "actual groups"). Part of this deficit can be attributed to the fact that sound waves tend to cancel each other out, reflecting one form of faulty coordination of social effort (Steiner, 1972). Another part, however, may be due to the fact that participants did not shout as loud or clap as hard in groups as they did when alone (a process I call "social loafing").

Individuals in another set of conditions shouted in "pseudogroups" in which they believed that others were yelling with them, although they actually yelled alone. This change eliminates coordination loss as a factor, allowing social loafing to be measured directly. Consistent with the view that pressures to work hard in groups are diffused, individual effort decreased as pseudogroup size increased, and the addition of the second through fifth other pseudoshouters had much less negative effect than the addition of the first (see Figure 7, "pseudogroups"). The data are well fit by an inverse power function with an exponent of less than one: Effort seems to decrease in proportion to the sixth root of the number of people working together. Similar effects have been obtained in the case of cognitive effort (Petty, Harkins, Williams, & Latané, 1977).

APPLICATION 10: CROWDING IN RATS

Recently many commentators have focused on urbanization and its concomitant, crowding, as a root cause of social disorder. A number of studies, employing both human and animal participants, have investigated the physiological and psychological effects of population size or density. Amazingly few of these studies have tested the relationship parametrically over more than a very restricted range. Results of the few that have done so seem generally consistent with a power law.

A number of studies, for example, have housed rats or mice together in groups of varying size for varying periods of time to study the consequences (often discouraging) of such crowding. In some of my own research on social attraction in rats, which basically deals with dynamic issues of social interaction rather than with the more static conception of social reaction treated here, we have varied the number of animals living together. Thus, Latané, Cappell, and Joy (1970) housed rats 1, 2, 3, 4, or 6 to a cage and then tested them in pairs for social attraction in an open field. As Figure 8a shows, isolated rats were the most gregarious, with each additional housing partner leading to decreased sociability. It should be no surprise, however, that the marginal impact of the first rat was much larger than that of the sixth. The effects of crowding seem to be in inverse proportion to the cube root of the number of rats living together. Hall and Latané (Note 2), sampling fewer data points but over a wider range, found similar results.

In addition to affecting sociability, the presence of other animals also affects physiological development. In a classic study, Christian (1955) compared the weights of reproductive organs of male mice housed in groups of various sizes (1, 4, 6, 8,
Figure 8. Social behavior in rats as a function of number housed together: a. Data on affiliation from Latané, Cappell, and Joy (1970) and Hall and Latané (Note 2); b. Data on reproduction from Calhoun (1967).

16, and 32) for one week before sacrifice. Significant overall differences were found on three dimensions: weight of preputial glands, weight of seminal vesicles, and, less strongly, overall body weight. Each of these relationships is more or less adequately described by a power function. Although it is unclear why the presence of other males should reduce the size of preputial glands or seminal vesicles, it is clear that the largest reduction came with the first few additional males, while the last 16 or 20 had relatively little impact.

Perhaps as a result of the effects cited above, group size also affects the rate of reproduction in closed rodent populations (Calhoun, 1967). As Figure 8b shows, the number of offspring per female per 100 days decreases as an inverse power function of the number of rats living together, with an exponent of less than one. Presumably, this would have the consequence of limiting the negative effects of overexposure to social impact for future generations.

The results of these studies, taken together, suggest that a power law has generality beyond human subjects and also beyond immediate impact effects. They also have implications for current discussions of crowding and its discontents. It seems that the effects of the presence of other organisms, whether beneficial or deleterious, are in the same direction whether there are few or many present (i.e., the relationships are monotonic). And the impact of additional organisms is largest not when there are already many present (as one might expect from some conceptions of crowding), but when the individual is isolated. As a matter of fact, after the first few others are present, additional crowding seems to have relatively little effect.

Conclusion

In the preceding sections of this article, I have discussed three principles of social impact and have presented data consistent with the principles from ten areas of empirical research. In conclusion, I briefly list six unresolved questions relating to the theory and two problems with it in its present form. Finally, I mention four characteristics of the theory that commend it, I believe, to our further attention.

SIX UNRESOLVED QUESTIONS

1. Can we achieve better measurement of social outcomes? This kind of theory, with its greater precision and specificity, requires ratio scaling. If it is to be useful in other domains of social psychology, we will have to improve our standards of measurement.

2. If indeed the psychosocial law involves a power function, what is the meaning of the exponent? Stevens (1975) believes there to be a characteristic psychophysical exponent for each sensory modality. Is there one for social impact?
3. How does one deal with individual differences in susceptibility to social impact? Perhaps individuals can be seen as differing in their mass, inertia, or resistance to change.

4. How do the acute effects of short-term exposure to impact transmute over time into chronic effects?

5. What happens when two or more groups act as simultaneous sources of impact, groups serve both as source and target of impact, social groups are heterogeneous with respect to the strength or immediacy of their members, and/or different psychological processes are triggered off at the same time? The general answer to these questions would seem to relate to how one combines and decomposes power functions.

6. Is the model descriptive or explanatory, a generalization or a theory?

TWO PROBLEMS WITH THE THEORY

1. The model views people as passive recipients of social impact and not as active seekers. A more perfected theory would incorporate mechanisms for people to control and direct their exposure to social impact.

2. The model is static and at present does not have a needed dynamic aspect. A more perfected theory would specify the means whereby the consequences of social impact cumulate as the people in a social setting react to and interact with each other.

FOUR CHARACTERISTICS OF THE THEORY

1. It is a general theory, drawing on basic laws, predicting to many domains, and encompassing a variety of processes.

2. But it is also specific in the sense that it is quantifiable, deals with parametric variations, and makes precise predictions about observable aspects of the real world.

3. Thus, it is falsifiable—if relationships turn out to be nonmonotonic, or if exponents are greater than one or have the wrong sign, the theory will be disconfirmed.

4. The theory is useful. It not only can provide a baseline for assessing interesting exceptions to these general laws, but it can provide a foundation for the development of many areas of social engineering (Latané & Nida, 1980). Every day people need to decide on which people to appoint to a committee, on whether to make a telephone call or write a letter, on how many students should be in a classroom, or on any of a number of other choices concerning the strength, immediacy, and number of people to involve in a social setting. We live in a period of great societal growth—populations are getting larger and people are becoming more interdependent. It is becoming more and more important to understand both the positive and the negative ways in which people have impact on each other and to design our physical and social environments so as to maximize the quality of life for all. I would like to think this theory will help.

REFERENCE NOTES


REFERENCES


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