

LIGHT, DECOR, AROUSAL, COMFORT AND COMMUNICATION

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Abstract

The effect of lighting level and room decor on interpersonal communication was investigated. Arousal and comfort models were invoked to generate hypotheses that (a) brighter lighting would stimulate more general communication, (b) lower lighting levels would encourage more intimate communication, (c) over time, lower light levels would dampen both general and intimate communication, and (d) home-like decor would encourage more general and more intimate communication. In a 2×2 between-subjects design, pairs of female friends wrote two letters to one another in bright vs. soft lighting and office-like vs. home-like decor. All the hypotheses were confirmed, except that brighter light encouraged more rather than less intimate communication.

Introduction

Early research on communication and self-disclosure concentrated on personality factors (Cozby, 1973). Later, research emphasized such social factors as degree of acquaintance and informational reciprocity (e.g., Won-Doornink, 1978). With this concentration on personal and interpersonal factors, little research concerned with the effects of the proximate physical environment on disclosure has been reported.

However, influenced by the work of Sommer (e.g., 1974) and others who have discussed the possible social effects of 'hard' architecture, a few investigators have examined the effects of the physical setting on disclosure and interpersonal communication. Sommer's (1969) own classic efforts to facilitate communication among female geriatric patients indicated that changes in the physical setting could increase conversation levels. Chaikin *et al.* (1976) found that more self-disclosure occurred in a 'soft' room than in a 'hard' one. Chaikin *et al.* defined 'softness' as a combination of indirect incandescent lighting, cushioned chairs, rugs, wall decorations and a few art objects; 'hardness' consisted of fluorescent lighting, hard chairs, bare walls and floors and no art objects.

In the studies of both Sommer and Chaikin *et al.*, several elements of the immediate physical setting were simultaneously varied. Which of these elements was instrumental in facilitating or inhibiting interpersonal communication remains unclear. Chaikin *et al.* acknowledge that their design did not permit conclusions about the independent effects of the several design elements comprising 'softness' and 'hardness'.

One major goal of the present study, therefore, was to begin a finer-grained analysis of the physical setting's effects on interpersonal communication. This study concentrates on two elements of the physical setting, lighting and decor.

Previous research has not been particularly concerned with theoretical models that might explain *how* light and decor might affect communication. Environmental

psychologists have long since abandoned naive determinist views that fail to posit plausible mediating factors between physical-setting variables and human behavior. Thus, a second major goal of this study was to initiate research on light and decor that advances a theoretical perspective, including suggestions as to mediators between environmental variables (light and decor) and behavioral variables (communication).

Light and Interpersonal Communication

Almost no research except for the studies by Chaikin *et al.* (1976) and Sommer (1969, 1974) has examined the effects of lighting on interpersonal communication. For theoretical ideas, we were forced to start with animal research. The evidence on light and activity at first appeared contradictory. Increased light seems to act as an arousal agent in monkeys (Alexander and Isaac, 1965), but not in cats (Isaac and Reed, 1961) or rats (Isaac and Kendall, 1967). However, this discrepancy has an obvious explanation: monkeys are typically diurnal, rats and cats typically nocturnal.

A reasonable thesis is that for humans, as for monkeys, light usually serves as a general arousal agent. Thus, human activity levels should generally increase in daytime or in bright light; as light dims, activity should slow. The invention of artificial light has enabled humans to be quite active after nightfall, but we remain 'diurnal' in that we still usually choose reduced lighting for relaxation and darkness for sleeping. Recent work by Munson and Ferguson (in Gifford, 1987) suggests that, at least for children, some forms of light appear to be more physiologically arousing than others. Perhaps, then, bright light acts as an arousal agent, stimulating a variety of behaviors, including amount of communication.

Carr and Dabbs (1974) found that dim lighting lessens eye contact and increases verbal latency in conversations. Amount or quality of communication was not studied. However, lowered eye contact and increased verbal latency suggest that subjects spoke more intimately, which is consistent with the results of Chaikin *et al.*'s findings for their 'soft' room. The 'soft' room, with its indirect lighting, presumably was illuminated at lower levels than the 'hard' room, although Chaikin *et al.* do not report illumination measurements.

Before specific hypotheses are advanced, the concept of interpersonal communication requires some differentiation. One person may communicate much information to another, but its content may be impersonal or only superficially personal. This low-intimacy form of interaction may be termed 'general communication'. Another person may communicate quantitatively little information, but its content may be very personal and intimate. In the present study, the term 'intimate communication' is reserved for this high-intimacy form of interaction. An arousal model would predict that general activity (in this case, general communication) increases when a person is more aroused, but not necessarily that the content of the output (intimacy of the communication) would increase. Lower light levels are associated, in some contexts, with an increase in intimacy. More expensive restaurants and the bedroom are two examples.

Based on the results of the studies described above and on the arousal model, three hypotheses concerning illumination are advanced. First, brighter lighting produces more general communication. Second, low light produces more intimate

communication. Third, both intimate communication and general communication decrease over time in softer light.

Decor and Interpersonal Communication

Decor has also been the subject of very few behavioral studies since the classic work of Maslow and Mintz (1956), which examined interpersonal perceptions rather than communication. Mehrabian and Diamond (1971) did investigate the efficacy of conversation pieces. Although such objects apparently did enhance affiliative behavior, examination of the regression equations in that study shows that the obtained effect was both complex and weak. One theme of this study and those of Chaikin *et al.* (1976) and Sommer (1969, 1974) is that comfortable, pleasant settings encourage more social interaction. Based on this comfort model, it seems reasonable to tentatively hypothesize that a 'soft' (more home-like) setting will evoke both more intimate communication and more general communication than will a 'hard' (more office-like) setting.

Method

Subjects

Female undergraduates in an introductory social science class were recruited by telephone on a voluntary basis (no payment in money or course credit) for 'a study of conversations'. It was decided to study communication in mature relationships rather than between strangers meeting for the first time, and women who volunteered were asked to bring a friend to the study. Thus, the participants were those who, since they already knew and liked one another, might be expected to exchange information with one another, in their daily lives. This procedure resulted in the participation of 72 women in the 18 to 25 age range.

When pairs arrived, they were assigned to one of four experimental conditions according to a rotating, predetermined order (i.e., condition 1, 2, 3, 4, 1, 2, etc.). The four conditions were those resulting from the combination of two levels of lighting and two levels of decor. These assignments were essentially random because the subjects suggested their own appointment times during the telephone call; neither they nor the experimenter could have known which appointment time would, once the schedule was complete, result in assignment to which condition.

The settings

An attempt was made to create lighting and decor conditions that might actually be found in natural settings. The bright light condition consisted of the normal fluorescent lights installed in the laboratory room when it was built a few months before the study began. Six ceiling-mounted 35-watt bulbs illuminated the 2.25 m × 3.55 m room. In the soft condition, one 100-watt bulb in a table lamp was lit. In the latter case, the lighting, although soft, was quite sufficient for writing without eyestrain. In physical terms, the bright condition averaged 90 footcandles at the two positions and the soft condition averaged 6 footcandles at the two positions, based on measures from a Canadian Research Institute photometer (model DPMT-ICC) that were color- and cosine-corrected for human perception.

In the office decor condition, typical modern office furniture, unembellished by

any personal touches, was used. Participants sat on armless molded-plastic chairs and the experimenter sat at a standard desk. The experimenter's desk was nearly covered with neat piles of paperwork. Textbooks were displayed on top of a plain metal file cabinet. A typewriter and the table lamp sat on a small table. The floor was covered with the office carpeting supplied when the room was built. A university calendar was the only wall adornment. In sum, the office was furnished in a standard way, tidy but somewhat bare and impersonal.

For the home-like decor condition, we attempted to create an office that might be found in the possession of a person who had made an effort to soften the institutional quality of the space. The same room was used and the desk and file cabinet were retained. The changes included adding a potted plant, hanging two art posters on the wall, placing a small decorative rug on the standard carpet, removing the typewriter, placing a tablecloth under the table lamp on the small table, and adding an antique wooden radio to the experimenter's desk, which was now clear of papers. The participants sat in padded armchairs instead of molded plastic chairs.

In all conditions the participants sat about 30 degrees from a face to face position at a distance of 1.5 m (chair center to chair center). Placed before each participant was a music stand that was adjusted to an angle and height suitable for writing.

Procedures

Upon arrival, the participants took their places and the experimenter explained that we were interested in the interactions between two people in an ongoing relationship; that we wished to learn about how people choose to let friends and acquaintances know about themselves.

A written-communication procedure (cf. Worthy *et al.*, 1969; Rubin, 1975; Archer and Berg, 1978) was chosen in favor of oral communication. We wished to avoid forcing the participants to tailor their statements to suit the presence of a third-party stranger, the experimenter. The subjects were all friends, but none of them was acquainted with the experimenter. Thus, a written communication approach combined with assurances of confidentiality presumably allowed fuller, freer and more intimate communication between friends than would oral communication with the experimenter present, or written communication with the expectation that the experimenter would be reading the material later.

Participants were told they would write two letters to their partners, but the letters would be delivered immediately after the session rather than being mailed. The participants understood and readily accepted that the purpose of asking them to write to one another instead of holding a conversation was to ensure the privacy of the communication between them. The participants were assured that the experimenter would never know the contents of their disclosures to one another.

Next, the participants were shown a list of 11 suggested topics for their letters (see Table 1). Most of the topics were selected from a longer list first used in disclosure research by Rubin and Shenker (1978). Some were adapted slightly and a few new ones were added, to ensure a broad range and depth of topics.

Participants were asked to select their first topic by blindly picking from an envelope slips of paper that had topic numbers written on them. To enable a comparison of participant responses on a common topic, all the slips requested the participant to write on topic 11, 'The things that I worry about the most'. They then wrote a letter on this topic to their partners. To allow a choice of topics in the second

letter, all the slips said, 'Choose any topic except the one you have already written about.'

No time limit was set for writing on either topic. Participants placed their completed letters in envelopes and were given the opportunity to exchange letters with their partners at the end of the session. The experimenter never saw the contents of the letters.

Measures

Variables in the study included, in order of administration: (a) questionnaire items about the relationship between the partners; (b) participant ratings of the intimacy of the 11 topics; (c) two measures of general communication and two measures of intimate communication; and (d) questionnaire items used to check the manipulation of the independent variables. Each of these will, in turn, be described more fully.

During the introduction phase of the study participants responded to a brief questionnaire containing three questions: 'How long has it been since you first knew or heard of your partner?' 'If there was any significant gap between the time you first knew of your partner and the time you first significantly interacted (i.e., spoke more than a brief greeting to each other), how long was this gap?' 'How would you characterize your present relationship?' For the latter item, seven labelled alternatives from 'Someone I try to avoid' to 'My closest friend' were offered.

Next, participants rated the intimacy of all eleven topics on 1 to 8 bipolar scales ('not intimate' to 'extremely intimate') at the time they were familiarized with them. These ratings were obtained to allow later analyses of the intimacy of topics selected by the subjects.

General communication was assessed by two measures, the total number of words written in each letter (*total words*) and the length of time each participant spent writing each letter (*writing time*). One measure of intimate communication, designed to respect the privacy of the interaction between friends yet encourage full and frank communication, was the total number of *self-referent words* used (e.g., I, me, mine, myself).

To maintain the confidentiality of the disclosures, the two word counts (total words for general communication and self-referent words for intimate communication) were made by the participants themselves after they had written both letters. The other general communication measure, writing time, was covertly measured by the experimenter.

The second measure of communication intimacy combined the intimacy of the topic and the intimacy of one's revelations on that topic. This measure, *intimacy*, was computed as the product of the topic's intimacy as rated by the participant and her response to the following questionnaire item: 'How intimate or revealing were your statements on this topic?' On both items, response categories varied from 1, 'Not at all' to 8, 'Extremely'. Thus, the intimacy score would be 30 for a *topic* judged by a participant to have an intimacy level of 5 with the participant's own disclosure intimacy *on* that topic judged by her to be 6.* The participants also reported which topics they had written on. This response was, of course, relevant

* The results of a MANOVA using only the participants' ratings of the intimacy of their disclosures, without the topic intimacy component, were very similar to those obtained in the MANOVA reported in the results section.

only for the second letter, but it was requested for both letters because participants believed that their first topic selection was random.

Finally, to check the manipulation of the independent variables, participants reported their assessments of the room at the end of the session. The two assessments of interest, of lighting and decor, were embedded among two others, of room size and aesthetics. The response categories for the decor items ranged from 1, labelled 'very informal, homey decor' to 8, 'very formal, office-like decor'. Response categories for the lighting item ranged from 1, 'Very soft lighting' to 8, 'Very bright lighting'.

Results

Manipulation checks and other method checks

The four experimental conditions were perceived as intended. The mean response on the decor item for the office conditions was 6.11 (i.e., more office-like); that for the home-like condition was 4.00. On the lighting item, the bright condition mean response was 5.78 (quite bright); that for the soft condition was 2.69. *t* values for the difference between the means of these responses both exceeded 5.25 ($P < 0.001$).

The possible effects of subject order (i.e., early vs. middle vs. late participation in the sequence of 72 subjects) and seating position (i.e., chair one vs. chair two within each condition) were examined. None of the dependent measures were significantly related to either of these variables (all $P > 0.10$), suggesting that procedures did not vary over the course of data collection and that the two seating positions were functionally equivalent.

Finally, the comparability across experimental conditions of participant responses to the common topic was checked. An analysis of variance examined differences among the four light and decor conditions in participants' topic intimacy ratings for the 'things I worry about' item. No significant differences were found (both main effects and the interaction $P > 0.20$).

Relationships and topics

In response to the three relationship questions, participants were found to be part of mature friendships. Partners knew one another for an average of 4.37 years, with an average gap between knowing *of* the other and establishing a functioning relationship *with* the other of 0.77 years. On the present quality of the relationship, the mean answer was 5.5, exactly between 'Definitely a friend' and 'One of my closest friends'. In sum, the average participant knew her partner for more than three years and felt that she was one of her closer friends.

The topics and their mean intimacy ratings may be seen in Table 1.

General and intimate communication

The means and standard deviations of the four dependent measures for each letter and condition are displayed in Table 2.

As may be seen, participants as a whole wrote just over 230 words on each topic, about a tenth of which (23.8) were self-referent words. They spent 12.4 minutes writing on each topic and, afterward, judged the intimacy of their communications, averaged across the two letters, to be 5.9 on the scale of 1 to 8; they felt their disclosures were 'quite intimate'. The intimacy of the topics themselves was judged

TABLE 1
Mean ratings of topic intimacy

1 My likes and dislikes in music	3.12
2 Why some people like me	5.39
3 The type of work I would like to do in the future	3.75
4 The kinds of sexual activity that I would prefer to engage in	6.77
5 My political views on the federal government	2.99
6 Why some people dislike me	5.32
7 My feelings about my sexual adequacy	6.53
8 My preference in food	3.07
9 The things that make me especially proud of myself	5.25
10 My religious views	4.36
11 The things I worry about the most	5.82

Note: Ratings are based on an 8-point bipolar scale on which 1 = not intimate and 8 = extremely intimate.

TABLE 2
Communication means by condition and letter

	Bright light		Soft light	
	Home-like	Office-like	Home-like	Office-like
<i>Letter 1</i>				
Total words	249.50	244.60	241.70	212.20
Self-referent words	23.50	28.22	27.27	24.72
Writing time (min)	13.14	11.59	13.95	11.75
Intimacy	44.17	32.89	32.50	34.11
<i>Letter 2</i>				
Total words	252.20	252.20	209.50	209.30
Self-referent words	21.72	24.56	18.89	21.67
Writing time (min)	13.61	12.35	10.26	9.45
Intimacy	44.33	28.44	24.00	23.83

Note: Intimacy scores are the product of two intimacy ratings, one for the topic itself and one for the participant's communication on the topic. Both are 1-8 scales with 8 = extremely intimate. Thus, higher scores indicate greater intimacy.

by participants to be 5.6, averaged across letters. Thus, the average Intimacy score was 33.0.

Multivariate analysis of variance (MANOVA) was used to investigate variations in communication as a function of light and decor. The analysis included the four communication measures as dependent measures, the two letters as a repeated measure, with light and decor as independent variables. The multivariate tests of significance showed that decor, letters, and the light \times letters effects were significant ($P < 0.05$), the Light effect was marginally significant ($P = 0.06$), and the other interactions were not significant (all $P > 0.20$). The significant effects will be described in turn.

Examination of the Decor effect [multivariate $F(4, 65) = 3.03$, $P < 0.025$] shows that at the univariate level, a general communication variable (writing time) and an intimate communication variable (intimacy) were marginally significant. Participants

spent 12.7 minutes writing in the home-like decor and 11.3 minutes writing in the office decor ($P = 0.06$). Intimacy scores were greater in the home-like decor (36.2) than in the office decor (29.9; $P = 0.08$). Thus, the hypothesis that more intimate communication and more general communication occurs in home-like settings is modestly confirmed for two dependent variables.

The significant effect for light [multivariate $F(4, 65) = 2.36$, $P = 0.06$] is manifested on the same two univariate measures. In both cases, more communication occurred in brighter light (12.7 vs. 11.4 minutes, $P = 0.09$, Intimacy scores of 37.5 vs. 28.6, $P < 0.02$). These results confirm the hypothesis concerning general communication, but are significantly opposite to the predictions made about intimate communication.

In sum, the results reported so far indicate that more intimate and more general communication occurs in home-like and bright conditions. Table 3 illustrates these trends.

TABLE 3
Mean writing time and intimacy by light and decor

Light	Decor	
	Home-like	Office-like
<i>Soft</i>		
Writing time (min)	12.1	10.6
Intimacy	28.2	29.6
<i>Bright</i>		
Writing time (min)	13.4	12.0
Intimacy	44.2	30.6

Note: See Table 2 for an explanation of Intimacy scores.

The third significant multivariate effect indicates that communication declined from the first to the second letter [multivariate $F(4, 65) = 6.39$, $P < 0.001$]. The effect was marginally significant ($P < 0.06$) for the general communication measure writing time: participants wrote for 12.6 minutes on the first letter and 11.4 minutes on the second letter. It was more clearly significant for the intimate communication measures. Writers used 26.0 self-referent words in letter one compared to 21.7 self-referent words in letter two ($P < 0.001$). Intimacy scores were greater in letter one (35.9) than in letter two (30.2; $P < 0.02$).

The letter \times light interaction was also significant [multivariate $F(4, 65) = 2.90$, $P < 0.03$]. The nature of this interaction (see Figure 1) is that communication rose or remained about the same from letter one to letter two in bright light but, as predicted, it declined from letter one to letter two in soft light. Participants wrote for 12.4 and 13.0 minutes in bright light, but 12.9 and 10.0 minutes in soft light ($P < 0.01$). On an intimate communication measure, Intimacy scores were 38.3 and 36.4 in bright light, but declined from 33.3 to 23.9 in less bright light ($P = 0.09$).

Discussion

The results clearly show that lighting and decor affect general and intimate communication. They are generally consistent with the proposals that arousal mediates

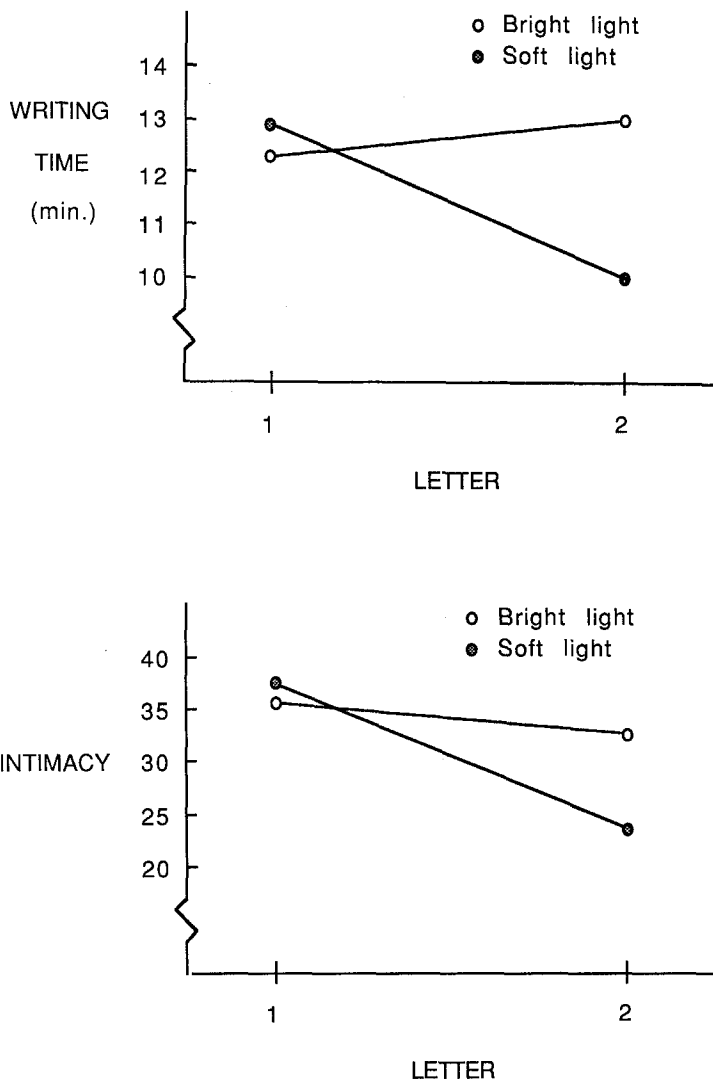


FIGURE 1. The decline of writing time and intimacy from letter one to letter two in soft lighting, compared to bright lighting.

the effects of light and that comfort mediates the effects of decor. The first hypothesis, that more general communication would occur in brighter settings, was confirmed. Second, more intimate communication was predicted for lower light levels. This was significantly disconfirmed; more intimate communication occurred in the brighter light than in the softer light. Third, communication declined in softer light from letter one to letter two, as predicted. Fourth, general and intimate communication were hypothesized to be greater in home-like conditions; these hypotheses were confirmed.

In most of these cases, support for the hypotheses came from one of the two measures of general and intimate communication. In the case of general communi-

cation, writing time was always the significant variable; total words never was. In the case of intimate communication, intimacy was always the significant variable; self-referent words was significant in only one case. If nothing else, this indicates the value of differentiating the concept of interpersonal communication and of the value of using multiple measures. Why light and decor are related to writing time but not total words is not clear. Intimacy, based on the participant's cognitive assessment of the topic and her own letter, is frequently related to light and decor while self-referent words, a mere word count, is not. Perhaps the word count measures, neither of which were very useful, are too subject to extraneous influences such as writing style. At least in the case of intimacy, a more psychological measure seems to be more sensitive to differences in light and decor than are the more mechanical measures.

The similarity of effects on intimacy and writing time raises the issue of their relatedness. They are conceptually different, but because they are similarly affected by the independent variables, are they highly correlated? No; they correlate 0.31, which is statistically significant, but they share less than 10% of their variance.

Lighting

One interesting outcome is the disconfirmation of the hypothesis predicting that soft lighting would be associated with more intimate communication. Because this hypothesis was derived from the Chaikin *et al.* study, a comparison of the studies may help elucidate the reasons for the discrepancy. One difference is that in this study participants judged the intimacy of their own disclosures, but in Chaikin *et al.*'s study another person (an interviewer) did so. Second, this study examined written communication but Chaikin *et al.* examined oral communication. Third, this study focused on established friendships but Chaikin *et al.* focused on interactions of strangers. Fourth, this study's participants were peers but in Chaikin *et al.*'s study a subtle but important status or role difference was present in that the experimenter, who was in her thirties, interviewed introductory psychology students who were presumably about a decade younger; also, the experimenter played a counselor role while the subjects played a counselee role. Any of these differences might have accounted for the opposite findings. One task for future researchers is to discover the conditions under which brighter light elicits more or less intimate communication.

The results for light are in accord with an arousal model. In the conditions of this study, more light produced not only more general communication but also more intimate communication.

The light \times letter interaction

As predicted, both intimate and general communication declined over time in softer light. The stronger effect was for writing time. The results are consistent with an arousal model that placing individuals in soft lighting will lower their arousal levels which, in turn, will lower their activity levels.

Most university lighting is at levels closer to our bright condition than to our soft condition. Thus, the arousal and writing time of participants in the soft lighting condition appears to have decreased with lengthening exposure to soft light, rather than that the arousal and writing time of bright-light participants increased with lengthening exposure to bright light.

Decor

More home-like decor was associated with more communication of both kinds. Homey decor probably is not only more physically comfortable, but it may also be more psychologically comfortable, evoking a sense of refuge and unguardedness that is associated with home. Both these feelings would be expected to encourage individuals to communicate more, both generally and intimately.

The letter main effect

One unexpected finding was that communication declined from letter one to letter two, not only in soft light as predicted, but regardless of light and decor. This may have happened for three possible reasons. First, participants may simply have tired of writing. However, total words did not change significantly from the first letter to the second, and the significance of the decline in writing time, the other general communication measure, was marginal. Second, the intimacy of what participants wrote on the second topic may have been lower. A *t*-test did not support this notion, either ($P > 0.10$). Third, the intimacy of the topic itself might have been lower for the second letter. This was true: the intimacy of topic one was 5.82 compared to 4.76 for topic two [$t(71) = 3.75, P < 0.001$]. This difference between letter one and letter two carried over into the intimacy scores, which were computed as the product of these two ratings. Letter one's mean intimacy score was 35.9; letter two's was 30.6 [$t(71) = 2.70, P < 0.01$].

Thus, it appears that the decline in communication over time is primarily a decline in the intimacy of what was written. This may have resulted from the choice of topics. The first (prescribed) topic, 'The things I worry about the most', was the third-most intimate of the 11 topics. At the outset of the study, topic intimacies were not yet known, so the selection of an opening topic could not have been guided by knowledge of the intimacy of this topic. The odds were, then, that a second topic would be closer to the mean intimacy of the remaining 10 topics. In fact, this mean was 4.66 and the mean intimacy of the remaining topics was 4.76. Therefore, the intimacy decline over time was probably due to this topic selection factor.

Design applications

In combination, the findings of this study suggest that if one wishes to increase both general and intimate communication, the setting should be normal-bright (i.e., about 90 footcandles) and home-like in decor. Naturally, these results so far may only be applied to female friends writing letters; broader generalization depends on research with other forms of communication, males, and stages of relationship. However, these results are sufficient to create caution about accepting the common notion that more intimate communication will occur in dimly lit settings. At the same time, they reinforce the notion that home-like settings encourage communication.

Conclusion

This study began as an attempt to clarify past studies which showed that changes in communication were related to the physical setting, but were unable to specify which

features of the setting were responsible. We posited that arousal and comfort mediate written communication and the results are generally consistent with these proposals.

The findings suggest some obvious future directions for researchers. Some of these were made salient in comparing this study's procedure with that of the Chaikin *et al.* study: oral versus written communication, who judges communication intimacy, interactions between friends versus strangers, and role or status differences. Research also might be directed toward assessing bodily states during communication under different lighting conditions to determine whether physiological arousal changes occur as the results of this study suggest. Whether or not the results are *best* explained by arousal and comfort models, the study (a) confirms the hypotheses that light and decor affect communication, and (b) places the research within a theoretical context. Another question for the future is whether brighter-than-normal lighting actually increases communication, in contrast to the present finding that normally bright lighting maintains communication levels while subnormal lighting levels diminish it.

Acknowledgements

I am grateful to Shirley Rolland for serving as the experimenter, to Timothy Gallagher and Paul Munson for advice and to the University of Victoria and the Social Sciences and Humanities Research Council of Canada for support.

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Manuscript received 3 August 1987

Revised manuscript received 24 May 1988