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Effects of Surveillance on Intrinsic Motivation

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EFFECTS OF SURVEILLANCE ON INTRINSIC MOTIVATION

by

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Abstract

Previous research indicates that explicit surveillance should induce subjects to attribute their performance at a task to the surveillance; hence, such subjects should persist to a lesser extent than subjects not exposed to such surveillance. Two forms of explicit surveillance were utilized: human and camera, as well as the appropriate opposites (human non- and camera non-surveillance). Subjects were directed to perform a model construction task, then were unobtrusively observed during a post-task "waiting period". No difference in persistence was found for type of surveillance utilized. However, as predicted, subjects exposed to surveillance persisted less with the task materials than subjects not exposed.

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The exclamation: "I can't do this with you watching me!" occurs frequently enough for almost everyone to be familiar with it. The usual result is for the observer to remove him/herself from the situation leaving the task-performer to continue happily on his way. Situations exist, however, in which role requirements constrain a person from expressing this feeling. For example, in industry it is expected that a supervisor has the right to observe the performance of a worker at any time; in penal or psychiatric institutions staff may observe the behaviour of inmates at any time; and in schools, teachers may assign tasks and then observe a student's performance.

Historical Perspective

The effect of an observer on one's performance at some task, although only recently begun to be studied within the framework of attribution theory, has its roots in the study of social facilitation.

As early as the late nineteenth century, psychologists studied what is now called social facilitation. Typically a person's behaviour on a task while working alone was compared with his behaviour at the same task performed in the presence of others. Such studies often found that the performance of a subject at a task was enhanced (increased above a stabilized level) both in the presence of an audience and in coaction (i.e. with individuals engaged in the same task) (Allport, 1920; Travis, 1925; Triplett, 1897). However, Allport (1920) found that this paradigm did not apply to more complex tasks. Pessin (1933) demonstrated that although an audience enhanced the performance of a subject at a well learned task, the presence of an audience inhibited learning of new responses. Zajonc (1965) summarized previous studies of audience

effects and coaction (including various types of tasks and audiences). He concluded from the research that both coaction and the presence of an audience enhance performance of a well learned ("dominant") response and inhibit the learning of new responses.

One direction that has apparently been overlooked by the social facilitation literature, is the long term effects of behaviour in the presence of others. That is, although social facilitation theory is able to make predictions concerning a particular subject's performance at a task (in the sense of whether a person will tend to perform the task on his own initiative) at some future time. Attribution theory provides a basis for making such predictions.

Theoretical Considerations: Attribution Theory and Intrinsic Motivation

Attribution theory generally encompasses the study of processes individuals utilize in analyzing their own and others' behaviour, in an attempt to perceive the causes of behaviour (Bem 1965, 1967, 1972; Jones Kanouse, Kelley, Nisbett, Valins and Weiner, 1971; Kelley 1967, 1973). Broadly speaking, attribution theory attempts to explain how behaviours are analysed in terms of factors originating in the environment, or externally; within the person, or internally; or a combination of both (Heider 1958; Jones and Davis 1965; Kelley 1967, 1973).

Before attribution theory was initially formulated by Harold Kelley in 1967, Koch (1956) noted that research in psychology tended to focus on all human motivation in terms of extrinsic factors. This, he postulated, failed to take into account much of human behaviour. He noted the need for a new "language"; that is, terms to explain intrinsic movitation.

Hunt (1965) posited a model intended to explain stages in the development of intrinsic motivation. In stage one, at birth, infants supposedly respond with attentional orientation and arousal to changes in ongoing input through the ears and eyes: "Something heard becomes something to look at" (p. 258). In stage two, objects, persons and places which have become recognitively familiar, become motivationally attractive, and this motivates efforts to retain or regain perceptual contact with the recognitively familiar: "Things should be recognizable" (p. 258). Finally, in stage three, there is an emergence of interest in what is novel in an otherwise recognitively familiar situation, focusing attention on new objects and places, and on manipulation of objects and exploration of places: "If you act you can make things happen" (p. 259). To summarize, Hunt (1970) explained that "by intrinsic motivation I mean that motivation which is inherent in information processing and action" (p. 1). Hunt developed this model within a very well referenced framework of physiological and cognitive developmental studies. He did not however, expand on social factors which may affect intrinsic motivation. What is of significance is that an attempt was made to formulate a developmental model of internally generated behaviours. What was lacking, however, was the conceptualization of perhaps other stages or factors which would reveal some understanding of the dynamics of adult intrinsic motivation.

At present this researcher has found no research extrapolating from Hunt's model. Some progress however, is being made from other directions (notably social psychology) toward defining some of the environmental and internal conditions affecting intrinsic motivation. Several theorists have attempted to explain the source and nature of

intrinsic motivation in the human psychological make-up.

From one line of thought relating to intrinsic motivation, Festinger (1954) postulated that "there exists in the human organism a drive to evaluate his opinions and abilities....the holding of incorrect opinions and/or inaccurate appraisals of one's abilities can be punishing and often fatal in many situations" (p. 117). This suggests that a drive may exist for a person to seek causes for his own and others' behaviour.

From another line of thought, DeCharms (1968) asserted that there is a tendency in man to "strive to be a causal agent....to be the origin of his behaviour" (p. 269). Hence, DeCharms suggested there is a tendency for a person to seek to define his causal role in a situation which demands some performance from him. If a person perceives the locus of causality for his behaviour to be within himself (that is, sees himself as "actor" or "origin") he experiences intrinsic motivation, and finds the situation or activity rewarding in itself. If a person perceives the locus of causality for his behaviour to be external to himself (that is, sees himself as "pawn") he experiences extrinsic motivation. Having some extrinsic motivation implies that the person is involved in the activity for the sake of some extrinsic goal, such as a reward or an avoidance of punishment.

Heider (1958) suggested that if a person works for the sake of some extrinsic goal, he may find the work itself "neutral or even disagreeable" (p. 126). B.F. Skinner's (1953) theory of reinforcement would seem to suggest the opposite regarding an external goal which is positive; that is, if a person receives some positive reinforcement for eliciting a certain behaviour, he will have a positive attitude toward performing that behaviour. However, this is not necessarily so — the person may find the only positive or agreeable aspect of the behaviour is the expected reinforcement. In another sense, a person could "sacrifice"

a behaviour. That is, a person could perform a non-preferred behaviour rather than a preferred behaviour for the sake of reinforcement.

Weiner (1972) noted that one quality that differentiates external from internal determinants of behaviour is that only sources of action attributed to the person (internal) can be labelled as "intentional". He goes on to suggest that "differential allocation of causality between the two factors also results in disparate affective experiences, future expectations and behaviours" (p. 315).

Operational Definitions of Intrinsic Motivation

At this point it is necessary to elaborate on what it is that researchers (in the area of attribution theory) refer to as intrinsic and extrinsic motivation. Nisbett and Valins (1973) point out that various researchers defined intrinsic-extrinsic motivation differently. For example, DeCharms (1968) refers to the internal as the causal role of the person, and the external as the causal role of the environment. Jones and Nisbett (1971) refer to a dispositional (intrinsic) versus situational (extrinsic) frame of reference. Dispositional characteristics are enduring personality traits of an individual, whereas situational characteristics are those which would generally elicit the same forces across different types of personalities to behave in a similar manner. Nisbett and Valins (1971) refer to factors intrinsic to a given stimulus versus those extrinsic or circumstantial. A person reacts to the functional aspects of a stimulus, assuming one is capable of "tunnel vision", or, on the other hand, one views that stimulus considering circumstances connected to that stimulus, a "wider lens vision" so to speak, giving weight to surrounding stimuli. For example, if a person is performing a task, with

few distractions present he is focusing on the factors intrinsic to the task, such as demands for performance from various parts of his body and mind. On the other hand, if the person is performing that same task with another person present who is evaluating his performance, the person tends to focus not only on factors intrinsic to the task but also the reactions (verbal comments, facial expressions) of the evaluating person.

Kelley (1967, 1973) proposed a complex model of the factors which an individual takes into account before concluding whether he is intrinsically motivated toward performing some task or enjoys some stimulus or situation. The four vital criteria which Kelley proposed are involved in the judgment of a stimulus are: distinctiveness (the impression one has of a stimulus during the presence of the stimulus), consistency over time (the same or nearly the same impression occurring each time the stimulus is present), consistency over modality (a consistent reaction occurring even though the mode of interaction with the stimulus varies) and consensus (knowledge of other observer's or actors' consistent reaction to the stimulus).

Theoretical Perspective of the Present Experiment

Considering these various frames of reference, it seems that Nisbett and Valins' (1971) definition is most useful in terms of experimental testing of intrinsically motivated behaviour (as described later in this section).

DeCharms' formulation does not adequately define factors which lead persons to conclude whether they are "origins" or "pawns". Aside from being simplistic, it would seem to imply an improbable view of individuals constantly striving to ascertain whether they or the world

is causing their reaction to the stimulus.

Jones and Nisbett's frame of reference (situational versus dispositional) does account for an understanding of some information processing of social interactions in terms of the Actor-Observer studies. "Different aspects of available information are salient for actors and and observers, and this differential salience affects the course and outcome of the attribution process" (Jones and Nisbett, 1971, p. 85). Since the actor has much information about his own abilities, his perceived difficulty of the task, his self-confidence, his past successes and failures at the task, or in general at other tasks, and the observer has little information about the actor other than the perceived performance at the task, actor and observer obviously would process different attributions concerning the task-oriented behaviour. Observers tend to make dispositional attributions concerning an actor's behaviour, whereas actors tend to make situational attributions concerning their own behaviour (Jones and Harris 1967; Jones, Rock, Shaver, Goethals, and Ward, 1968; Jones and Nisbett, 1971; Nisbett, Caputo, Legant, and Maracek, 1973; and Snyder and Jones 1974). Although these studies do not seek what attributions actors think observers are making, it seems reasonable that actors may intuitively understand the attribution process occurring within observers. Perceiving the inequity in the amount of task-relevant information available to observers and themselves, actors may find the presence of observers objectionable or aversive. These studies tend to confirm a probably very prevalent difference in attributions. However, little progress is made from this direction of research toward discovering how an actor might come to make dispositional attributions concerning

his own behaviour.

Kelley proposed what seems an acceptable model for explaining the attributional process. However, the complexity of that model does not readily lend itself to experimental confirmation. Manipulation and analysis of the relevant factors would heavily tax the resources of a researcher, as well as involve some considerable control over individual subjects. For example, confirmation of the model would perhaps involve the recording of some physiological measure (e.g. galvanic skin response or G.S.R.) for distinctiveness of impression of a stimulus. This measure would have to be recorded several times to ascertain whether the individual subject's reaction to the stimulus was consistent over time. This would have to be recorded with the stimulus presented in several modes: that is, the individual would have to interact with the stimulus in several different ways. Finally the individual would have to observe other individuals reacting (via G.S.R.) consistently in a certain fashion to the stimulus. After all this, the individual should form his judgment of the stimulus. The model is valuable to some researchers in that complex models often reflect more valid statements about human behaviour than simple models do. However, considering the disadvantages in utilizing the model (time required to test each subject, equipment, number of possible stimuli to choose from) the model seems impractical for experimental testing.

The model of intrinsic-extrinsic motivation proposed by Nisbett and Valins (1971) seems most conducive to progressive research. Essentially the nature of the problem (concerning intrinsic motivation) through this model is: what are the important factors of circumstance which tend to

enable an individual (actor) to focus on a particular stimulus or task? Also, the problem (concerning extrinsic motivation) might be stated as: what are the important factors of circumstance which tend to result in an individual focusing on the stimulus plus the factors surrounding the stimulus?

A possible answer to these questions may exist in statements from other attribution theorists. Bem (1965, 1967, 1972) and Kelley (1967, 1973) suggested that individuals may, in the absence of an easily discernible external basis for their behaviour, use their behaviour as evidence of some relatively stable internal characteristic. For example, when no salient external reward is present for performing a behaviour, individuals may conclude that the activity or situation is rewarding in itself.

London and Nisbett (1974) have formulated a theory to extend this idea:

> The theory may be schematized in the following way: (1) an internal cue (2) arouses evaluative needs. The evaluative needs lead in turn to a (3) process of explanation in terms of (4) an external cue (p. 13).

If an individual's behaviour in a situation arouses evaluative needs within that individual, and, if no external cues are readily available for purposes of explanation then the individual may assume that his behaviour originated from some "relatively stable internal characteristic".

Research Related to the Present Experiment

Deci (1972), Lepper and Greene (1975) and Lepper, Greene and Nisbett (1973) have demonstrated the consequences of salient external rewards. Deci found that college students who were paid to engage in an interesting activity showed a greater decrease in performance from the

first to the third engagements than unpaid controls. Lepper and Greene and Lepper, Greene and Nisbett, in similar experiments found that children who were promised a reward and rewarded for performing an interesting activity interacted significantly less with the target activity during a normal classroom session some time later than did unexpected reward and unrewarded controls. Thus, presence of rewards may be seen as one factor in the environment leading individuals to infer that their performance at a task was extrinsically motivated. This assumes, of course, that spontaneous manipulations of similar task materials at a future time indicates intrinsic motivation.

There is some evidence that other factors may serve as cues for extrinsic motivation. Deci (1972) found that threatened punishment (for failure to solve interesting puzzles correctly) led to fewer spontaneous manipulations of similar materials when left alone (compared to unthreatened controls).

Lepper and Greene (1975) demonstrated that surveillance may have the same undermining effect. Nursery school children were informed that they would be watched periodically through an obvious television camera while they performed a task of solving interesting puzzles. These children interacted significantly less with the target activity, later, in a normal classroom session, than did children who worked at the puzzles with the camera pointing away from them. Lepper and Greene manipulated high and low frequency of surveillance (surveillance during the solving of four of the six puzzles versus surveillance during the solving of one of the six puzzles) and found no difference. Subjects in both high and low surveillance conditions interacted less with the target activity than non-surveillance subjects.

These studies suggest that certain explicit extrinsic cues have an effect on persistence (future behaviour) at a task. Other studies indicate that the salience of extrinsic cues may be lessened or the salience of internal cues increased with quite different effects. Valins (1966) found that male undergraduates believing a prerecorded sound track to be their own heart beat, tended strongly to prefer nude photographs shown in conjunction with a change in this bogus heart rate over others shown when the "heart rate" was "normal". Davidson and Valins (1969) demonstrated that behaviour change was more likely to be maintained if it was attributed to oneself than if it was attributed to a drug. Subjects withstood more electric shocks in a normal condition than when the attributed their lack of ability to a skin-sensitizer (actually a placebo) pill. Bowers (1975), via post-hypnotic suggestions, led subjects to self-attribute preferences for certain types of pictures in an art judgment task. The manipulated preference persisted during later test trials, even when the post-hypnotic suggestions were inoperative.

Aside from the differential effects of intrinsic and extrinsic attributions in terms of future behaviour, Kruglanski, Friedman and Zeevi (1971) found differences in some qualitative aspects of task performance. Subjects in a no-incentive as opposed to promised reward condition exhibited superiority in creativity of performance and in task recall, manifested a stronger Ziegarnik effect (that is, a tendency to remember incompleted tasks) and reported greater enjoyment of the experiment.

The above mentioned studies provide evidence that certain salient extrinsic (to the stimulus) cues may affect an individual's reaction to a stimulus task. The problem then arises in recognizing the presence

of an extrinsic cue affecting intrinsic motivation. Increased initial performance may not be sufficient evidence of the presence of an extrinsic cue affecting the behaviour: it is possible that intrinsic motivation may produce the same effect. Although qualitative aspects of task performance in conjunction with salient extrinsic (or lack of) cues may stand further examination, themeasurement of such is still not sufficient to predict future behaviours. It seems that persistence at a task (spontaneous manipulation of the task materials) at a future time, in the absence of external compliance, is at present the only observable measure of an internally generated behaviour, or, an intrinsically motivated behaviour.

If persistence at a task is to be a goal (in a social interaction introducing a task behaviour) it seems that extrinsic cues should be relatively subtle or non-salient. Examples of explicit extrinsic cues (in previous research) affecting persistence at a task include evidence of factors such as rewards, threats of punishment and surveillance. Appropriate control groups, which tended to persist to a greater extent at the tasks, were those subjected to the same procedure without the aforementioned explicit extrinsic cues present.

Experiments testing effects of these explicit extrinsic cues tended to involve only one observation of persistence. Concerning the effectiveness of a single interaction, Kelley and Thibaut (1971) have suggested that a brief sample of behaviour may serve chiefly to introduce attributional instability and consequent information seeking. Perhaps the "consequent information seeking" may involve performance at the task at a future time, if such an opportunity should exist. The tendency to persist at the task at a future time may be explained in these terms, and

the future opportunity may as easily disconfirm as confirm the person's attribution.

Valins (1974), however, suggested that consequences of this future information-seeking behaviour may tend to be biased in the direction of the attribution made during the previous, subtly-generated behaviour. In Valins' (1974) experiment, male undergraduates, even after being informed that the heart rate that led them to prefer certain photographs over others was really a bogus heart rate, still expressed preference for those photographs over others.

Rajala and Ross (1973) tested the hypothesis that surveillance affects persistence, as did the Lepper and Greene (1973) study; however the two methodologies differed. Lepper and Greene utilized both sexes of nursery school children as subjects, a television camera as a surveillance technique, did not attempt to control for performance (in terms of time), and conducted the post-experimental persistence measure two weeks later. Rajala and Ross utilized male undergraduates as subjects and the physical presence or absence of the experimenter as a surveillance technique. They attempted to control for performance, and obtained the persistence measure through immediate post-task unobtrusive observation. Both experiments yielded significant results; that is, subjects in the surveillance condition tended to persist less at the target task behaviour than subjects in the non-surveillance condition. However, the Rajala and Ross study yielded a substantial number of zero persistence scores for both experimental and control groups, which precluded the possibility of utilizing a parametric test of the results.

Although the Rajala and Ross experiment yielded significant

results in terms of a one tailed, non-parametric test, its results were questionable.[1] The results of the Lepper and Greene study were also questionable, this experimenter felt, in terms of whether nursery school children were able to understand the significance of the television camera. Perhaps the television camera meant something entirely different to the children than the surveillance it was intended to represent. The Lepper and Greene experiment also presented problems in terms of control of extraneous factors. During the post-task persistence measure, conducted unobtrusively in a normal classroom setting, many children were present and some of these may have interacted with the task materials for an inordinate amount of time. Hence, some of the children placed under surveillance in the experiment may not have had sufficient opportunity to interact with the puzzles during the normal classroom session. Since the results of both previous surveillance studies were questionable, the present study was conducted, to provide a more direct and meaningful test of the relationship between surveillance and persistence at a task.

The Present Experiment

This study constituted a further attempt to ascertain the the effects of surveillance on intrinsic motivation as measured by persistence at a task with an adult population. The main hypothesis of this experiment was that subjects placed under surveillance during the task time will persist to a lesser extent during a post task free-time period than subjects not placed under surveillance during the task time. The presence of surveillance, as attribution theory suggests, should

lead subjects to attribute their performance at the task at least to some extent to the presence of the surveillance. Hence, once the surveillance is removed, the subjects under surveillance should continue to interact with the task materials to a lesser extent than subjects who had not been under surveillance.

Of further interest, this experiment compared human surveillance and camera surveillance. This was done to elicit any possible differences between the two types of surveillance, since both types of surveillance are present to some extent in previously mentioned constraining situations (e.g. industrial settings). Also, previous research has included both human and camera surveillance but apparently no one has compared the two in one study. Although it is not possible to make an explicit hypothesis with respect to human versus camera surveillance differences, one might expect human surveillance to have a greater impact. That is, subjects under human surveillance should persist less than subjects under camera surveillance. One might speculate that human surveillance is more salient since subjects can readily confirm that they are being observed and can verbally interact with the observer. With camera surveillance, subjects cannot readily confirm that they are being observed. That is, it is not possible to verbally interact with the observer and it is possible that the observer may periodically be engaged at other tasks.

For the purpose of this experiment persistence is defined as spontaneous interaction with the task materials (tinker toys) in the absence of external constraints such as expectations, role requirements, etc. The interaction as such, covered a wide variety of manners in which the task material might be interacted with. For example, a subject might

touch only one or two pieces, manipulating them in various ways, obviously not constructing a model as a work unit (as defined during the performance trial). A subject might even have constructed a model then disassembled it, all this time being counted as interaction with the task materials.

The construction of tinker toy models was chosen as the task for this experiment, because the experimenter felt that this task had certain advantages. First, tinker toys constitute a relatively novel task material, not likely to have entered the particular subject group's repertoire of behaviour for some considerable length of time, e.g. 10-15 years, since childhood. Hence this would eliminate differences in performance due to differential practice effects.[2] Secondly, the task material is relatively simple to manipulate. That is, it is expected that few people would have trouble constructing models. Thirdly, with this task, performance may be measured, both in number of models constructed and total number of pieces used in the models.

Since Henchy and Glass (1968) found that "threat of evaluation in the absence of an audience can produce energizing effects upon performance about identical to those obtained when experts are observing the individual" (p. 452), an attempt was made, in this experiment, to control for performance through the emphasis that the individual subject's performance would be scored afterward. Hopefully, this would have produced "energizing effects" on the performance of subjects in the non-surveillance conditions to counteract effects of social facilitation on performance in the surveillance condition.[3] Thus, regardless of condition, subjects believed that their performance was to be evaluated.

A post-task questionnaire (Appendix B) attempted to elicit qualitative differences in task performance, as perceived by the subjects.

An attempt was also made via post-experimental questioning (Appendix D) to ascertain the subject's awareness of the surveillance or lack of it, and to determine what subjective effects each particular condition produced.

Method

Subjects

Subjects who volunteered to participate in the experiment were sixty-eight single male undergraduates, enrolled in the introductory psychology course at Wilfrid Laurier University. Experimental participation is encouraged but not required for introductory psychology students at W.L.U.

Procedure[4]

Seventeen subjects were randomly assigned to each of four conditions:

1. human surveillance present
2. human surveillance absent
3. television camera present, operative, directed at task area
4. television camera present, inoperative, directed away from task area.

As each subject entered the experiment room (see Appendix A for experimental setting), the experimenter directed him to be seated in a chair before the table. On the table there were a shallow box full of tinker toy pieces (approximately four hundred pieces) and a list of models to build. On a stand beside the table there was a large, empty box. The experimenter sat in a chair to one side of the table and instructed each subject as follows:

> "What I want you to do is to simply build some models. This is a timed task; you will have twenty minutes to work on it, and afterwards I have a questionnaire I'd like you to fill out. I'm interested in finding out how many models you can build in the time allotted, as well as how well they approximate the object. This may be seen as sort of a trade off between quantity and quality. I want you to start at the top of this list of models and work your way down, building each one as it comes up. I want you to build whatever you think

> each one looks like; they can be either two or three dimensional. Don't skip any one if you think it's too hard; just make something that looks like it. As you finish each model, I want you to put it in the box over here (indicating large, empty box), because I've got to take the models out to score them after the time is up. You've got twenty minutes to work at this, but you don't have to finish all the models within this time. Just do what you can. I'll let you know when the time is up. Do you have any questions?....Okay, you can start now."

For human surveillance subjects (HS), the experimenter,[5] after instructing the subject to start, sat back, noticeably activating a stopwatch. The experimenter watched the subject building each model (apparently timing each model constructed) and made copious notes on his clip board. The experimenter briefly answered any questions asked by the subject.

For human non-surveillance subjects (HNS), the experimenter rose after the instructions, commenting: "I'll leave you to work at this and I'll let you know when the time is up." Then, after noticeably activating a stopwatch, he left the room.

For camera surveillance subjects (CS), the experimenter commented: "I would like to observe your progress at the task by means of this camera". Then, after plugging in the camera to activate it (actually a dummy camera with an obtrusive red light activated when the camera was plugged in), the experimenter left the room.

For camera non-surveillance subjects (CNS), (that is, the television camera was present in the room, but not activated, and was pointed toward a wall away from the subject) the experimenter proceeded similarly as for the human non-surveillance condition, making no mention of the camera's presence.

For all conditions, after the twenty minutes of task time, the experimenter re-entered the room (or rose, in the human surveillance condition), and commented: "Okay, time is up". If the subject was in the process of building a model, the experimenter instructed him to put what was done of it in the box with the rest of the models.

The experimenter then picked up the box of models built, explaining: "I have to take these out to be scored and you may wait here. It will only take a few minutes, then I have a questionnaire I'd like you to fill out." The experimenter then left the room, taking the box of models and list, and proceeded to the observation room. Before leaving, in the camera surveillance condition, the experimenter casually unplugged the camera, commenting: "I won't need this any more".

Approximately one half minute later the experimenter began recording the subject's persistence time (using two stop watches). The observation of persistence time was unobtrusive, by means of a real television camera disguised behind an intercom speaker screen in the ceiling of the experiment room and focused on the table with the tinker toy pieces on it. The picture of activity on the table was projected to a television monitor in the adjacent (observation) room. The persistence time measure consisted of the time spent touching tinker toy pieces within the ten minutes immediately following the experimenter taking position for observation.

After recording the persistence time, the experimenter returned to the experiment room bringing the box of models and a copy of the questionnaire. The experimenter commented: "Here is a questionnaire I'd like you to fill out".

The questionnaire (see Appendix B) contained four evaluative questions and one filler question. The evaluative questions concerned forced choice ratings of task interest, enjoyableness and difficulty, and a rating of subject nervousness during the experiment. The filler question (#3, given simply to balance the page) concerned rating of the task on several irrelevant dimensions; for example, good to bad.

The experimenter then left the room commenting: "I'll leave you with that for a few minutes". One minute after the subject completed the questionnaire (observed by means of the television monitor) the experimenter returned.

The experimenter then asked the subject questions to determine what the subject thought the experiment was about (see Appendix D). Following this, the experimenter probed subjects with questions concerning their awareness of their experimental condition, how it made them feel toward the task and what effect they thought their condition had upon their performance at the task (see Appendix E for the responses). The experimenter then debriefed each subject as to the real purpose of the experiment, the deception used (as well as why it was necessary), and revealed the observation room and its contents (see Appendix G).

Finally, the experimenter asked subjects not to reveal anything of the experiment or experimental setting to anyone, explaining that he would be running more subjects and that naive subjects were needed for valid results. The experimenter thanked each subject for taking part in the experiment and promised feedback when the experiment was finished.

After each subject left, the experimenter counted the number of models (unfinished models were counted as whole models), the total number of pieces used and disassembled the models.

Results

Task Performance

A 2 x 2 factorial analysis of variance for number of models constructed (see Table 1 for means, Table 2 for analysis of variance) indicated no significant difference between presence or absence of surveillance. Type of surveillance (human versus camera) did not significantly affect number of models constructed, nor was there a significant interaction effect.

A 2 x 2 factorial analysis of variance for number of pieces used in construction of the models (see Table 3 for means, Table 4 for analysis of variance) also indicated no significant difference between presence or absence of surveillance. Type of surveillance (human versus camera) approached significance, F (1,67) = 3.55 $p < .06$. That is, subjects in the human surveillance and human non-surveillance conditions tended to use more pieces than subjects in their camera counterparts ($\bar{X}$ (human) = 120.89 pieces, $\bar{X}$ (camera) = 106.44 pieces). The interaction effect was not significant.

Persistence

A further 2 x 2 factorial analysis of variance with persistence times (see Table 5 for means, Table 6 for analysis of variance) indicated a significant main effect for presence or absence of surveillance, F (1.67) = 12.12 $p < .001$. Subjects who had been under surveillance persisted less ($\bar{X}$ = 2.77 minutes) than subjects who had not been under surveillance ($\bar{X}$ = 5.42 minutes). Type of surveillance however, was not significantly different, nor was there a significant interaction effect.

TABLE 1

Mean Number of Models Constructed

	Human	Camera	Overall $\bar{X}$
Surveillance	13.00	10.65	11.83
Non-Surveillance	10.35	10.59	10.47
Overall $\bar{X}$	11.68	10.62	11.15

Note. Maximum number possible = 20.

Number of subjects in each cell = 17.

TABLE 2

Analysis of Variance:
Number of Models

Source of Variation	Sum of Squares	D.F.	Mean Square	F
$Surv_a$	31.118	1	31.118	2.736
$TSurv_b$	19.059	1	19.059	1.676
Surv x TSurv	28.471	1	28.471	2.503
Residual	727.876	64	12.038	
Total	808.523	67		

a Surv = presence vs. absence of surveillance
b TSurv = human vs. camera surveillance

TABLE 3

Mean Number of Pieces Used

	Human	Camera	Overall $\bar{X}$
Surveillance	129.24	107.41	118.33
Non-Surveillance	112.53	I05.47	109.00
Overall $\bar{X}$	120.89	106.44	113.88

TABLE 4

Analysis of Variance:
Number of Pieces

Source of Variation	Sum of Squares	D.F.	Mean Square	F
$Surv_a$	1477.779	1	1477.779	1.481
$TSurv_b$	3545.309	1	3545.309	3.554
Surv x TSurv	926.484	1	926.484	.929
Residual	63839.426	64	997.491	
Total	69789.000	67	1041.627	

a Surv = presence vs. absence of surveillance
b TSurv = human vs. camera surveillance

TABLE 5

Mean Persistence Times (Minutes)

	Human	Camera	Overall $\bar{X}$
Surveillance	2.52	3.02	2.77
Non-Surveillance	5.39	5.44	5.42
Overall $\bar{X}$	3.96	4.23	4.09

Note. Maximum time = 10 minutes

TABLE 6

Analysis of Variance:
Persistence

Source of Variation	Sum of Squares	D.F.	Mean Square	F
$Surv_a$	118.880	1	118.880	12.115*
$TSurv_b$	1.291	1	1.291	.132
Surv x TSurv	.838	1	.838	.085
Residual	628.029	64	9.813	
Total	749.039	67	11.180	

a Surv = presence vs. absence of surveillance
b TSurv = human vs. camera surveillance

*$p < .001$

To elicit any correlation between performance and persistence, the factors of number of models, number of pieces used and persistence time were correlated by means of Pearson correlation coefficients. These calculations were based on all of the data, disregarding experimental conditions. A significant correlation was found between number of models built and number of pieces used ($r = .63$, $p < .001$). Number of pieces and persistence failed to relate significantly ($r = -.18$); however, number of models and persistence related significantly in a negative direction ($r = -.22$, $p < .05$).

Since a significant negative correlation was found between a number of models built and persistence scores, the possibility arose that a third factor may have interfered with the persistence behaviour of subjects. For example, possibly subjects were fatigued after building many models and therefore didn't persist as much as those who built fewer models. On the other hand subjects may have been frustrated because they couldn't complete as many models as they wished to, and therefore persisted more than those who had built more models. Thus an analysis of covariance was performed on persistence scores to control for number of models built. This analysis confirmed the significance of the main effect for surveillance $F(1,67) = 10.07$, $p < .005$ (see Table 7 for the Analysis of Covariance and Table 8 for the adjusted means).

Questionnaire Responses

The scores on each of the four variables within the questionnaire were collapsed into two groupings for purposes of analysis. All of the positive directed scores were placed in one category, and all of the

TABLE 7

Analysis of Covariance
of Persistence Times
Adjusted for Number of Models Constructed

Source of Variation	Sum of Squares	D.F.	Mean Square	F
$Surv_a$	98.232	1	98.232	10.07*
$TSurv_b$	15.340	1	15.340	1.572
Surv x TSurv	.027	1	.027	.003
Residual	614.718	64	9.757	
Total	728.317	67	18.704	

a Surv = presence vs. absence of surveillance
b TSurv = human vs. camera surveillance

*$p < .005$

TABLE 8

Adjusted Means:
Persistence Times and Models Built

	Surv[a]	NonSurv[b]	Mean[c]
$\bar{X}_d$	11.824	10.471	11.1475
$\bar{Y}_e$	2.769	5.413	4.091
$\bar{Y}'_f$	2.864	5.495	4.180

a Surv = human and camera surveillance
b NonSurv = human non- and camera non-surveillance
c Mean = grand mean
d $\bar{X}$ = mean number of models
e $\bar{Y}$ = mean persistence times (minutes)
f $\bar{Y}'$ = adjusted mean persistence times

negative directed scores were treated as the other category. A Chi square one way analysis of variance for k independent samples (Siegel, 1956) was applied to the four groups of scores for each of the variables. No significant differences were found for any of the variables (see Table 9).

While this analysis (Chi square) is appropriate for the data at hand, it wasted a good deal of information (i.e. by collapsing six categories into two). Thus analyses of variance were carried out on the original responses to each question by assigning numbers (one through six) to the response categories. Only one significant effect was found. Subjects under surveillance rated themselves as being more nervous than subjects not exposed to surveillance, $\underline{F}$ (1,67) = 4.75, $p < .05$.

Raw scores on the questionnaire items were then correlated for all subjects, regardless of experimental conditions, with performance and persistence scores, by means of a Spearman correlation coefficient (Siegel, 1956). None of the questionnaire item responses related significantly with the main measures of performance and persistence.

Probe Responses

In addition to the major measures of this experiment, each subject was, before being debriefed, asked what effect his particular condition had on his performance at the task. Responses to the question (see Appendix E for actual responses) were categorized in terms of positive (e.g. better, faster, more), negative (e.g. bothered, nervous, did less) or no effect (e.g. no effect, not bothered, no thought) (see Table 10).

TABLE 9

Number of Subjects in Each Condition Rating Items in a Positive Direction

	HS[a]	HNS[b]	CS[c]	CNS[d]	Total/68
Interest	11	14	15	12	52
Enjoyable	14	13	12	11	50
Difficulty[e]	5	6	5	9	25
Nervous[f]	7	12	8	12	39

Note. Maximum score = 17 (i.e. n = 17 in each condition)

a Human surveillance
b Human non-surveillance
c Camera surveillance
d Camera non-surveillance
e Scores reflecting "easy"
f Scores reflecting "calm"

TABLE 10

Responses Concerning Effect of Condition on Performance at the Task

	No Effect	Positive	Negative
Human surveillance	6	6	5
Human non-surveillance	5	12	0
Camera surveillance	12	2	3
Camera non-surveillance	13	3	1

Discussion

As hypothesized, subjects exposed to surveillance during the task time interacted significantly less with the task materials when surveillance was removed than subjects not under surveillance initially. It seemed to make no difference whether the surveillance was in the form of human or camera surveillance.[6] Other explanations such as fatigue, satiation, etc., were not supported since there were no significant differences in performance of the groups, either in number of models built or number of pieces of material used.

Evidence that a fatigue or satiation effect could be possible within the constraints of the experimental situation existed from the significant negative correlation between number of models built and time spent persisting with the task materials. That is, the greater the number of models an individual built, the less time he tended to persist in interacting with the task materials. This led to the possibility that some other factor may have served as an explanation for the different persistence times. Subjects who built more models may have felt satiated and thus they may have persisted less. Conversely, subjects who built fewer models may have felt frustrated or incomplete, hence they may have persisted more. These other possible explanations were not supported. The analysis of covariance of persistence times adjusted for number of models built confirmed the significance of the surveillance effect.

From the analysis of the questionnaire data it seemed that subjects in all conditions perceived the task similarly in terms of interest, enjoyableness and difficulty. However, from the analysis of variance of nervousness scores it seemed that surveillance made those

subjects more nervous, hence they apparently had a greater need to relax. It is noteworthy that this possible greater need to relax involved significantly less interaction with the task material. One might speculate that this need for relaxation might just as well have been satisfied by further interaction with the task materials. At this point it is apparent that further research is needed to clarify the relation between surveillance and nervousness, as well as how they affect persistence at task oriented behaviour.

As reported, all subjects were asked whether their particular condition (presence or absence of surveillance) had any effect on their performance at the task. The data (Appendix E) seems to indicate that surveillance does not produce an overwhelming negative effect. In fact over half of all subjects (36/68) indicated surveillance or lack of it made no difference on their performance. A substantial number reported positive effects (23/68), while a relatively small number of subjects reported negative effects (9/68). This suggests several possibilities: surveillance or lack of surveillance makes no subjective difference to a task performer, the subject population was not accustomed to thinking about questioning the presence or absence of surveillance, or the questions asked may have been unsuccessful in producing candid responses.

Although attribution theory was useful in generating this research, it seems that no one direction of attribution theory entirely explains the phenomenon. For example, the difference in persistence times of the surveillance and non-surveillance groups seems to be predicted from the theories of Bem (1965, 1967, 1973), Kelley (1967, 1973) and London and Nisbett (1974). If a subject's behaviour at the task aroused evaluative needs, the subject may have sought an

explanation for that behaviour in terms of external cues. For subjects in the surveillance conditions, an external cue was readily available in the form of the surveillance. Hence they may have concluded that their behaviour at the task was a result of the surveillance and that they had relatively little internal disposition toward performing the particular task. For subjects in the non-surveillance conditions, an external cue was not readily available. None of the typical external cues serving to motivate behaviour, such as rewards or threats of punishment, were obvious in the situation. Hence non-surveillance subjects may have concluded that their performance at the task was a result of some relatively stable internal disposition. This conclusion may have led in turn to further interaction with the task materials.

Although such an explanation seems quite plausible, the difference in persistence times may also be explained in terms of Jones and Nisbett's (1971) theory. As they suggested, there is an inequality in the amount of task-relevant information available to an actor as opposed to an observer. That is, all subjects had much information concerning their own abilities, their perceived difficulty of the task, their past successes and failures at the task and, in general, at other tasks. The experimenter, whom subjects may have presumed to be evaluating their performance (and possibly them as persons), obviously had little of that information. It is possible that subjects may have resented this evaluation in terms of some unknown standard without the taking into account of the information that was salient to them.

Since the salience of evaluation was greater for subjects in the surveillance conditions (a glance would serve to remind them) those

subjects may have resented the evaluation to a greater degree. Some of this resentment may have been transferred subsequently to the task. Hence subjects under surveillance persisted less with the task materials than subjects not under surveillance.

Other theories outside of the context of attribution theories also seem to account for the phenomenon. Festinger (1957) stated that cognitive dissonance may result from"... engaging in an act discrepant with prior attitudes..." (p. 261). All subjects may have to some extent felt that performing at the particular task (tinker toys) was incongruent with prior attitudes toward the task. Surveillance may have justified the incongruity of performance at the task for those subjects. Hence, once the surveillance was removed, those subjects may have continued to perform in a manner congruent with their prior attitude which manifested itself in relatively lesser interaction with the task materials. With the salient incongruency of performing at the task uncoupled with any salient justification, subjects in the non-surveillance conditions could have attempted to reduce their dissonance afterwards. They may have done this through greater continued interaction with the task materials to convince themselves that they really liked to perform at the task.

A cognitive dissonance viewpoint is not entirely viable however. The auspices of scientific investigation may have lent seriousness and credibility to performance at the task. Also, subjects may have presumed that other subjects performed at the task hence it was acceptable to do so. For these reasons any effect of prior attitudes may have been discounted. Nevertheless, since subjects were not questioned

concerning prior attitudes toward the task, it is not known whether performance at the task induced any cognitive dissonance.

Finally an explanation of the phenomenon may exist in terms of the demand characteristics of the experimental situation. Demand characteristics may be defined as those cues which convey the experimental hypothesis to the subject. As Orne (1962) suggested, subjects can be expected to 'behave in an experimental context in a manner designed to play the role of a "good subject", or in other words, to validate the experimental hypothesis' (p. 778). If such cues were present, subjects in the surveillance conditions may have perceived that they should not continue to interact with the task materials, and acted accordingly. Also, subjects in the non-surveillance conditions may have perceived that they were expected to continue to interact with the task materials and acted accordingly. This explanation is not plausible however, since all subjects were given the same instructions concerning the task, and subjected to the same procedure differing only in presence or absence of surveillance. Furthermore, during the post experimental questioning, none of the subjects indicated any idea of the real purpose of the experiment, making it unlikely that demand characteristics accounted for the difference in persistence times.

Clearly, the connection between a student subject manipulating a few tinker toy pieces and, for example, an industrial worker performing work units involves a considerable inferential leap. However, there are similarities in both situations which may help narrow the gap. Both this experimental situation and industrial settings involve constraints which limit the amount of other potentially more attractive

pursuits for behaviour. In fact, since the work materials are the only manipulable objects present, the choices for the subject or worker are to (a) not manipulate the work materials or (b) manipulate the work materials to a greater or lesser extent.

This experiment involved only one trial observation of persistence behaviour. However, an industrial worker may often find himself involved in a similar situation (in which his activities are confined to the work materials) where there are no obvious external constraints. Obviously important information to him regarding what he should do is what he did the first time. If a worker manipulates the work materials to a great extent during the first time that he is free from external control, then he may self-attribute a preference for interacting in that manner toward his environment.

The situational constraints of this experiment and of industrial settings are similar, differing perhaps in expectation of what should be done during the period of unconstrained activity. Subjects in this experiment did not expect to have to continue constructing models whereas workers are expected to continue completing work units. Since presence or absence of surveillance made a significant difference in the tendencies of subjects to continue to interact with the task materials, perhaps presence or absence of surveillance would make a difference in the tendencies of workers to continue completing work units during unconstrained times. Further research is needed to determine whether this is indeed the case within the context of an industrial setting.

It must be emphasized that this experiment represents a single measure of a surveillant-surveillee interaction, with only one particular

type of surveillance. Existent patterns of surveillance which may differ considerably on several dimensions might produce different effects. For example the characteristics of the surveillant may be radically different. A relatively silent non-interactive type of surveillance such as this experiment represented may produce radically different results in terms of persistence than a warm, open, coequal type of surveillance. Also, longer term interactions between surveillant and surveillee may provide quite different effects. Possibly the reaction of a person to surveillance in terms of persistence may be ameliorated over a lengthy period of such interactions. Further research might pursue what kinds of variables strengthen, weaken or even reverse the surveillance phenomenon.

Of concern is the basic inherent nature of the task. In this case the social facilitation phenomenon may be of interest in further research. For example, interesting tasks may be complex and relatively novel in nature, in which case surveillance may hinder performance as well as persistence. On the other hand, uninteresting tasks may be simple in nature in which case surveillance may be useful in facilitating increased performance. High frequency of surveillance may be necessary in the case of an uninteresting task, to ensure continued performance.

Strickland (1958) and later Kruglanski (1970) and Kipnis (1972) found evidence that the more a supervisor initially monitored the performance of a worker, the less he tended to trust the continued output of that worker in the absence of his supervision. Such supervisors also chose to monitor such workers more frequently in

later performance trials than workers whom they had initially not monitored as frequently. Lepper and Greene (1975) noted that:

> Such self-fulfilling cycles, like 'superstitious' behavior, are not likely to be discovered by the participants, who have no reason to be skeptical of the necessity of a system of overt extrinsic controls; indeed the mere existence of such controls bears testimony to their necessity (p. 485).

The results of the present study suggest that surveillance may be a significant tool in the manipulation of behaviour. Simply, if one wishes to undermine another's persistence at a task (providing the task is inherently interesting and one has the institutional powers to so observe), all one has to do is explicitly and frequently watch that person performing the behaviour, then remove the surveillance. On the other hand, if one wishes to foster intrinsically motivated behaviour, as indicated by a greater continued interaction with task materials during unconstrained times, it may be best to simply introduce the task behaviour and leave the task performer alone. In therapeutic situations it may be well to combine surveillance of asocial behaviour with more subtle suggestions (and lack of explicit surveillance) concerning other forms of more socially acceptable behaviour. In industrial settings it may be of value to utilize less surveillance of employee production. Finally, in classrooms, especially at the primary and secondary levels where teacher presence is almost total during the normal day, it may be beneficial to develop situations in which the teacher removes his/her surveillance while pupils are busily engaged at some pre-determined learning or practice task.

Obviously these are oversimplified recommendations and based on little data. Further research is needed concerning many aspects of the

surveillance phenomenon. For example, research might pursue what the optimal level of surveillance (i.e. Observer-Actor interaction frequency) is in order to obtain "persistence" effects. Another direction of interest is whether existing patterns of surveillance can be changed and whether a decrease in frequency of surveillance would enhance persistence at tasks. If this is possible, it would be beneficial to both actor and observer in reducing the onus of surveillance from both.

If, as Kipnis (1972) has proposed, the mere availability of institutional powers is virtually sufficient to ensure their use, Lepper and Greene (1975) speculate that it would not be surprising to find a prevalence of such self-perpetuating cycles of surveillance-distrust-surveillance in our society. Further research into the existent systems of surveillance (therapeutic, industrial, academic and others) may prove that such surveillance may be a phenomenon that occurs to a very limited extent. Indeed, surveillance in terms of the presence of one who is more versed in aspects of performance of a task and thus able to help a task performer is necessary and desirable at times. However, further research within the existing systems of surveillance may also provide clues to the solution of social problems such as ineffective therapy, job dissatisfaction and high employee turnover rates, as well as possibly academic failure and high dropout rates.

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Footnotes

[1]Traditionally a one tailed test is used only when previous research indicates the direction of an effect. Since no previous research existed concerning effects of surveillance on persistence, the significance of the one tailed test (where the use of a two tailed test was not significant) might indicate spurious results.

[2]This was confirmed in the post-experimental interview such that none of the subjects indicated any recent experience with the task materials.

[3]Social facilitation literature suggested that individuals performing at a simple task, while in the presence of others, would perform to a greater extent than individuals performing that task while working alone. If this had resulted within the present experiment, other explanations for different persistence times would have been possible. For example, individuals in surveillance groups could possibly have persisted less because they were more fatigued or satiated than individuals in non-surveillance groups.

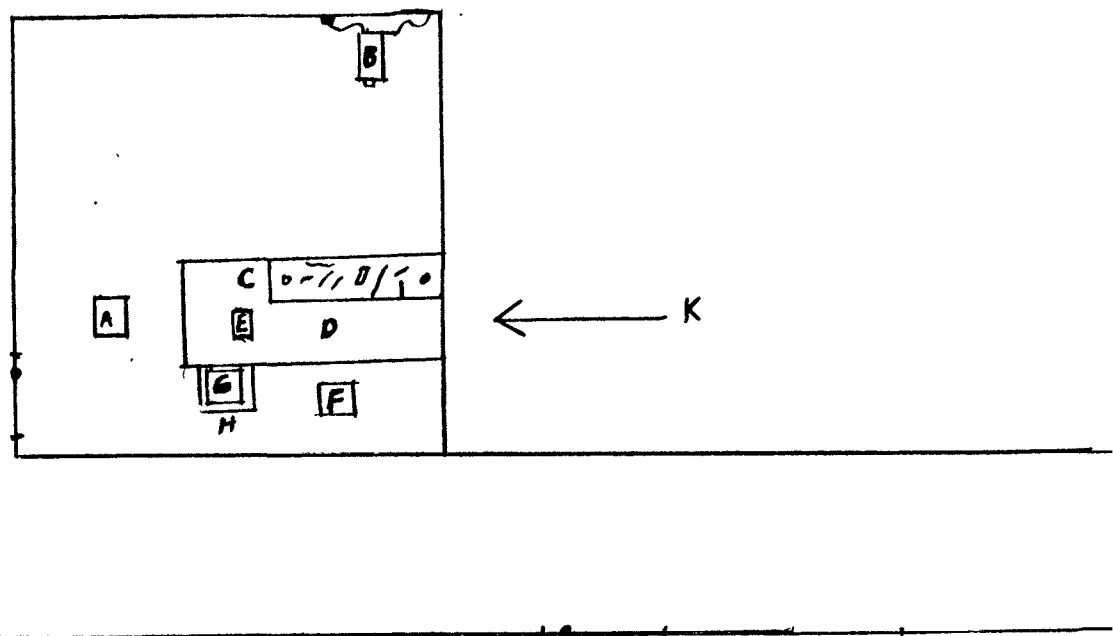
[4]The general procedure was adopted from the procedure developed for the Rajala and Ross (1973) study. The task and persistence measure times (20 minutes and 10 minutes respectively) were chosen to best suit the typical "one hour experiment". This left sufficient time to introduce the subject to the task, as well as to conduct the post-experimental questioning and debriefing. The number of models (20) on the list was found to be sufficiently large such that subjects were highly unlikely to construct all the models within the task time. The number was also small enough such that subjects would feel that there existed a possibility of completing all of the models within the task time.

[5]The experimenter representing human surveillance was a male graduate student of pleasant appearance, approximately of the same age group as the subject population.

[6]Concerning the effectiveness of the camera as a surveillance technique with the subject population, informal feedback suggested that subjects in the camera surveillance condition were convinced that the camera was real and that they believed they were being watched during the task time.

APPENDIX A

Setting



A Experimenter chair
B Television camera (dummy)
C Box of tinker toy pieces
D Table
E List of models
F Subject chair
G Large empty box
H Stand for empty box
I Observation position
J Television monitor
K Television camera, above work area of the table, concealed behind intercom speaker screen

APPENDIX B

Sample Questionnaire

Questionnaire

Please answer the following questions by placing an X in the appropriate rating: for example, (__X__).

somewhat interesting

1. How interesting did you find the mechanical task?

very uninteresting	somewhat uninteresting	slightly uninteresting	slightly interesting	somewhat interesting	very interesting

2. How enjoyable did you find the mechanical task?

very enjoyable	somewhat enjoyable	slightly enjoyable	slightly unenjoyable	somewhat unenjoyable	very unenjoyable

3. Evaluate the mechanical task on the following dimensions:

meaningful _____/_____/_____/_____/_____/_____ meaningless

unimportant _____/_____/_____/_____/_____/_____ important

useful _____/_____/_____/_____/_____/_____ useless

good _____/_____/_____/_____/_____/_____ bad

inferior _____/_____/_____/_____/_____/_____ superior

4. How difficult was the task?

very difficult	somewhat difficult	slightly difficult	slightly easy	somewhat easy	very easy

5. How nervous were you during the experiment?

very calm	somewhat calm	slightly calm	slightly nervous	somewhat nervous	very nervous

APPENDIX C

Raw Data

Data Abbreviation Code

H.S.	human surveillance
H.N.S.	human non-surveillance
C.S.	camera surveillance
C.N.S.	camera non-surveillance
MOD	number of models
PCS	number of pieces
PERSIS	persistence/10 minutes
INT	interest
ENJ	enjoyableness
DIFF	difficulty
NERV	nervousness
MEAN	meaningfulness
IMP	importance
USE	usefulness
GOOD	goodness
SUPERIOR	superiority
+	indicates positive, e.g. +3: very interesting
-	indicates negative, e.g. -3: very difficult

CONDITION H.S.

MOD	PCS	PERSIS	INT	ENJ	DIFF	NERV	MEAN	IMP	USE	GOOD	SUPERIOR
10	80	.05	+1	+1	-1	+3	+1	-2	+1	+1	-1
11	71	.05	+3	+3	-3	+1	+3	+3	+3	+3	+3
16	204	.05	-1	+2	-1	-2	+2	+1	+2	+1	+1
12	153	.08	+2	+1	-1	+2	-2	-2	+1	+3	-1
8	96	.47	+1	+1	+1	-1	-1	-1	-1	+1	-1
14	116	.51	+2	+2	-2	-2	+1	+1	+1	+3	+2
13	141	.51	+2	-1	+1	-2	+1	+1	+1	+2	+1
15	175	1.14	+1	+2	+2	-1	-3	-3	+2	+2	-1
11	138	2.08	+2	+1	-1	+2	+1	+1	-1	+1	+1
13	156	2.16	+2	-1	-2	-3	-2	+2	-2	-2	-2
17	158	2.88	+3	+2	+1	-3	-1	+1	+1	+1	-2
7	40	4.28	-2	+1	-2	-1	-3	+1	+1	+1	-1
12	85	4.34	-1	+1	-2	-1	-1	-1	-1	-1	-1
19	141	4.55	-1	+1	-1	+2	-1	-2	+1	-2	-2
9	116	4.91	-1	-1	-2	+2	-2	+3	-3	-3	+1
15	183	5.35	-1	+1	+2	+2	-3	-2	-2	-1	-2
19	144	9.48	+3	+3	-2	-1	+2	+2	+2	+2	+2
$\bar{X}$	$\bar{X}$	$\bar{X}$									
13	129.24	2.52									
s^2	s^2	s^2									
3.55	43.62	2.64									

CONDITION H.N.S.

MOD	PCS	PERSIS	INT	ENJ	DIFF	NERV	MEAN	IMP	USE	GOOD	SUPERIOR
15	145	.03	-2	+2	-1	+2	+2	-1	-1	+1	+1
10	132	.52	+1	+1	+2	+3	+1	-2	-1	-1	+1
9	144	.64	+2	+1	-1	+2	+2	+1	-2	+2	-1
6	100	3.68	-2	+2	-1	+3	+1	-2	-2	+1	-1
10	119	4.00	+2	+2	+2	+3	+1	-1	-1	+1	+1
13	132	4.20	+3	+3	+2	+2	+3	+2	+2	+3	+1
9	87	4.59	-2	-1	-2	+1	-3	-3	-3	+1	-1
10	111	4.80	+3	+2	+1	+3	+1	+2	-2	-2	+1
13	105	4.99	+2	+2	-1	-1	+2	+1	+2	+2	+2
9	73	5.23	+2	-1	-1	-1	+1	+1	+2	+2	+2
12	131	5.60	+2	-2	+2	-1	+1	-2	+2	+1	-1
10	104	6.48	+3	-3	-2	+2	-1	+1	-1	+2	+1
8	86	7.29	+2	+2	-2	-1	+2	+1	+2	+2	+1
9	77	9.58	+3	+3	-2	-1	+2	+2	+2	+2	+1
16	132	9.94	+2	+2	-1	+3	+2	+2	+2	+1	+1
10	142	10.00	+2	+2	+1	+2	-1	-1	-1	+2	-1
7	93	10.00	+3	+2	-2	+2	-1	-2	+2	+3	+1
$\bar{X}$	$\bar{X}$	$\bar{X}$									
10.35	112.53	5.39									
s^2	s^2	s^2									
2.67	24.09	3.24									

CONDITION C.S.

MOD	PCS	PERSIS	INT	ENJ	DIFF	NERV	MEAN	IMP	USE	GOOD	SUPERIOR
16	182	0	+2	-1	+3	+3	-1	-1	-2	+1	+1
14	84	0	-2	-2	-1	-3	-2	-2	-2	-2	-2
12	97	0	+2	-2	-1	-1	+2	+1	+2	+2	+2
11	84	0	-3	-3	+1	+2	-2	-2	-1	-1	-1
5	76	0	+1	+2	-1	+1	+2	-1	+1	+2	+2
16	131	.29	+1	+1	-1	-1	+2	-2	+1	+1	-1
12	137	1.93	+1	+1	-1	-1	+1	+1	+1	+1	+1
11	108	2.64	+2	+2	-1	-1	+1	+1	+2	+2	+1
5	59	2.72	+3	-2	-2	+2	+2	+1	+2	+3	+1
11	135	3.50	+2	+2	-1	+2	+1	+1	+1	+1	+1
15	136	3.53	+2	+1	-2	-2	+1	-2	+2	+1	-1
11	78	3.81	+1	+2	+3	-1	+3	+3	+3	+3	+2
10	133	4.48	+3	+2	-3	+2	+3	+1	-1	+2	+1
9	87	4.83	+2	+1	-1	-1	+2	+1	-1	+1	-1
9	99	5.96	+2	+2	+2	+2	+2	+1	-2	+1	+1
5	93	8.64	+2	+1	+2	-1	-1	-1	-1	+1	-1
9	107	8.97	+2	+2	-1	+1	+1	+1	-2	+2	-1
$\bar{X}$	$\bar{X}$	$\bar{X}$									
10.65	107.41	3.02									
s^2	s^2	s^2									
3.50	30.95	2.92									

CONDITION C.N.S.

MOD	PCS	PERSIS	INT	ENJ	DIFF	NERV	MEAN	IMP	USE	GOOD	SUPERIOR
12	113	0	-2	-1	-1	+3	-3	-3	-3	-1	-1
12	102	.20	+2	-2	+1	+3	+3	+2	+2	+3	+2
8	96	.76	+2	+2	+2	+3	+2	+1	+1	+2	+1
17	120	.94	-2	+1	+2	+3	-2	-2	-2	+1	+1
17	105	3.05	+1	+2	-2	+3	+2	+2	+3	+2	+2
10	91	3.22	+2	+2	-1	+1	+2	+1	+1	+1	+1
9	138	4.67	+2	-3	+3	+3	+3	+3	+3	+3	+3
11	142	4.99	+1	-2	+1	+1	-3	-1	-2	+1	-1
9	117	5.49	+2	+2	+2	+3	+1	+1	+1	+2	-1
13	100	6.17	+1	+2	-1	+2	-1	+1	-2	-1	+1
3	77	6.21	-2	-2	+3	-2	+3	+3	+3	+3	+1
7	100	8.05	-1	+1	+2	+3	-1	-1	-1	+1	-1
15	123	9.46	+3	+3	-1	-1	+2	+3	+3	+2	+1
8	71	9.54	+2	+1	-1	-2	+1	+1	+2	+1	-1
10	140	9.86	+2	+1	-2	-1	+1	-1	+1	+1	-1
7	60	9.87	-1	-1	-2	-1	-2	-2	-2	-2	-3
12	98	10.00	+3	+2	+2	+2	+1	-1	+2	+3	+1
$\bar{X}$	$\bar{X}$	$\bar{X}$									
10.59	105.47	5.44									
s^2	s^2	s^2									
3.68	23.43	3.64									

APPENDIX D

Post Experimental Questioning Procedure

Post-Experimental Questioning

Questions to Subject by Experimenter:

"What do you think this experiment was about?"

"Do you think I might have been looking for something else in this experiment?"

...(If so) What do you think that that might be?"

Probing of Surveillance Subjects

1. Camera surveillance

   "How did you feel about doing the task?"

   "What did you think of the television camera?"

   "Do you feel that it had an effect on your working on the task?"

2. Human surveillance

   "How did you feel about doing the task?"

   "What did you think of me being present while you were doing the task?"

   "Do you feel that my presence had any effect on your working at the task?"

Probing of Non-Surveillance Subjects

1. Camera present, inoperative,

   "How did you feel about doing the task?"

   "What did you think of the television camera?"

   "How did you feel about being left alone to do the task?"

2. Human surveillance not present

   "How did you feel about doing the task?"

   "How did you feel about being left alone to do the task?"

APPENDIX E

Verbal Reports of Effect of Surveillance or Lack of Surveillance on Performance

The following question was asked of subjects:

"Do you feel:

(for) human surveillance: my presence

human non-surveillance: being left alone

camera surveillance: the camera's presence

camera non-surveillance: being left alone

had any effect on your working the task?"

The actual responses (see following page) were rated in the light of being positive, negative or neutral of subjective effect. Although the rating of the responses was essentially subjective, very close inter-judge agreement was obtained using the following key:

positive: better, more, faster...

negative: bothered, did less than could have, nervous...

neutral: no effect, not bothered, no thought...

Actual Responses

H.S.	H.N.S.	C.S.	C.N.S.
no effect	none really	none	no thought
thought more carefully, wondered if doing it right	better than if..	nervous, found task difficult	felt better, able to think clearer
felt nervous, more frustrated	felt okay, better performance	no effect on performance but nervous	felt good, couldn't possibly finish all, took time
none	did well, better than if...	didn't really affect performance, wasn't bothered	better performance
none, didn't bother	felt okay, much better than if..	did more, felt being tested	no effect, but didn't think did so well
none, didn't really bother	felt okay, probably more than if..	none, no effect	took my own time, didn't bother
thought speed important quantity (went for)	thought did better, complexity rather than quantity	no effect, didn't bother at all	didn't bother, made complex models
very nervous but time limit had more effect	did more, felt better	no effect, noticed but completely forgot it	none
did more, didn't bother at all	none, no effect	dampened frustrations, felt pressure of time	didn't bother at all, went for quality
bothered	better, did best could	not really, didn't bother	none
nervous, affected most when built lousy models	did better, more peaceful	not much effect	none
put more into it, at first bothered then not	did better	bothered, not as fast as could	not bothered, but did less than could have
nervous, hurried faster	did better, felt better	faster	none
did more, didn't really bother	none, didn't bother	not really bothered, none really	none, not at all
none, not really	didn't bother at all	none	none
a little bothered	none	none, probably not bothered	none
not really	probably did more, more relaxing	not really	none

APPENDIX F

Verbal Debriefing and Written Feedback

Debriefing

What I am interested in finding out is simply whether the presence or absence of surveillance has an effect on your working at the task. Actually I am not particularly interested in how well you performed at the task, but rather whether or not you continued to work at the task after I left the room with your models. I have four groups of subjects, or four conditions rather, one in which I am present while a person works at the task, a second in which I am not present, a third in which there is a television camera present - which is incidentally a dummy camera - and a fourth in which there is a television camera present but not working and not pointed at the table.

What I am looking for basically, is to find out whether persons persist less at the task after being subjected to surveillance than persons who were not under surveillance. That is, I am interested in whether or not you continued to use the tinker toys after I left the room with your models.

How I was aware of whether you used them or not was by means of a (for T.V. surveillance condition: real) camera disguised up there (experimenter indicated camera) which is connected to a television in the next room. This camera only focuses on the work area of the table. I had to watch without you knowing or your natural reaction to continue or not would have been affected. After I left the room with your models, the time you spent out of exactly ten minutes was recorded. This persistence time will be recorded for all subjects, and the times for each condition will be compared to see whether surveillance really does affect persistence at a task.

Do you understand now what the experiment was about? (The experimenter answered any questions from the subject.)

Okay, now to perhaps explain the why of this experiment. If surveillance does affect one's persistence at a task, this experiment could be of importance in areas such as schools, industry, prisons and perhaps hospitals. Simply, if you want a person to continue doing something, and perhaps be more interested in it, do not watch him while he is doing it. (The experimenter then expanded further by examples.)

(Optional, if requested:)

Now, you continued on with the task for __ out of ten minutes. (The experimenter then discussed the implications of the subject's persistence measure, emphasizing that it need not fit the expected paradigm.)

Do you have any further questions?

I can show you my other room with the television monitor if you wish to see it. (The experimenter then proceeded to do so. Once within the observation room, the experimenter briefly explained the procedure once again, then emphasized that the monitor transmitted no sounds, as well as focused only on the work table: hence providing subjects with some measure of privacy.)

Okay, I'll have to ask you not to talk to anyone about this experiment until I have finished because it is important not to have anyone know anything about it if I am to get valid results. I will be mailing a copy of my final results to you when the experiment is completed. Thank you for taking part in this experiment.

Wilfrid Laurier University

Waterloo, Ontario, Canada N2L 3C5. Telephone (519) 884 1970

Dear Student,

Some time ago you participated in a study concerning "Effects of Surveillance on Intrinsic Motivation". As promised, the following are the overall results of the experiment.

Measures taken were: Performance: number of models, number of pieces used; Persistence: time spent continuing with the material; Questionnaire items: interest, enjoyableness, difficulty and nervousness, and a "filler" question.

Several statistical analyses were applied to the data from the four conditions which were: human surveillance (experimenter present), human non-surveillance (experimenter absent), camera surveillance (television camera operative), camera non-surveillance (camera present but inoperative, pointed away).

No significant differences were found between groups in terms of performance (models or pieces), nor any of the questionnaire ratings; however, persistence times differed with the non-surveillance groups persisting more (almost twice as much) than the surveillance groups. This was found significant at the .001 probability level, supporting the hypothesis that surveillance affects persistence at a task.

A more detailed account of the experimental rationale and results will be available at some future date, through the Wilfrid Laurier University library. Thank you for participating.

Richard Rajala

(M.A. candidate)