

Inebriation and Inspiration? A Review of the Research on Alcohol and Creativity

ABSTRACT There is a conception that a uniquely positive correlation prevails between the intake of alcohol and creativity, but only a few experimental studies address this subject. Existing studies together with recent experiments are reviewed. This later series of experiments explored whether or not moderate alcohol intoxication (1.0 ml of 100% alcohol/kg body weight) facilitated different phases of the creative process, i.e. preparation, incubation, illumination, verification, and restitution. A hypothesis is derived which postulates that modest alcohol consumption inhibits aspects of creativity based mainly on the secondary process (preparation, certain parts of illumination, and verification), and disinhibits those based mainly on the primary process (incubation, certain parts of illumination, and restitution).

INTRODUCTION An oft-recurring motif of antique Grecian urns depicts Apollo holding the hand of Dionysius (Dodds, 1964). Why should Apollo, the God of form, sensibility, rational thought, and retrospection, stroll hand-in-hand with Dionysius, the God of intoxication, ecstasy, and intuition? May (1994) refers to Nietzsche (1872/1987) who has discussed the *Dionysian* principle of exuberance, as well as the *Apollonian* principle of structure and order, within a dialectical synchronization that is functional during creative production. It seems clear that the ancient Greeks, far from experiencing these two Gods as mutually incompatible, sought to unite and illuminate the theatrical deity of Dionysius with Apollo's deity of artistry. An even stronger association between the two was manifested by the Delphi oracle (Flacelière, 1987). The story goes that within the

confines of Apollo's temple at Delphi the priestess, Pythia, who was also the vocal expression for the God, would fall into a trance or *enthusiasm* (the word derives from en-theo = in divinity) and then utter "the words of the oracle." It is also interesting to notice that the cult of Dionysius was maintained in great honor at Delphi. Within the temple not only the famous gold statue of Apollo but also the grave with Dionysius' earthly remains were placed, underlining the unity of these two deities in classical Greek culture.

In this article I assess the influence of alcohol upon the creative process. The dominant method of researching this topic has been through interviewing and surveying people involved in the arts (especially authors) and through biographical studies of creative and successful people (Grant, 1989). One problem with the interview method is that the authors' answers may be characterized by consideration of what seems appropriate to answer, rather than a description of the actual nature of their own unique experience or behavior. Further, a low response rate may lessen the value of the survey. For example, a majority of the authors approached declined to participate in The Swedish Authors Association annual calendar on the theme of intoxication and inspiration (Malmberg, 1948). The biographical perspective is fraught with even greater potential sources of error because of the dependence on secondhand and retrospective information. Often such analyses consist mostly of lists of a large number of alcoholic authors (e.g. Kazin, 1976/77).

Certain studies have greater scientific value, mainly because the researchers have been aware of the fragility of the interview and biographic method and thus have been more careful about method as well as conclusions. In one such study, Koski-Jännes interviewed 60 Finnish authors (a third female authors) about their use of alcohol in the creative process (Koski-Jännes, 1985). For most of the authors alcohol, was related, positively and negatively, to the different phases of the writing process. She also found that the phases of the creative process as described by Wallas as early as 1926 (Wallas, 1926/1970) comprehensively described the creative process of writing: *preparation* (gather experience and ideas), *incubation* (maturing-phase), *illumination* (creation of insights and inspiration), *verification* (the execution, the writing). Her point-of-departure concerned production, rather than reproduction, i.e. the recreation of "productive forces." Without reproduction after hard creative work the writers would soon be "burned out." Taking

this aspect into consideration, she suggested a fifth phase called *restitution*, or the recovery-phase. Koski-Jännes' material seems to indicate that excessive use of alcohol occurs mostly during the incubation and restitution phases. Only two writers declared they were drinking regularly during the verification phase. On the other hand, several of the writers stated specifically that they could not write under the influence of alcohol.

It is interesting to compare Koski-Jännes' interpretation of Wallas with a debate in two large Swedish newspapers where authors and other artists elaborated their views on drinking and creativity (Norlander, 1992; Norlander & Gustafson, 1993). Even this material indicated that it was immediately before and after the illumination and verification phases that the intensive alcohol use appears. Such articles ought to be evaluated with some caution, as there may be contradictory remarks made by the same writer.

Contemporary and recent-past Swedish artists and authors have expressed certain views of the alcohol "experience," including: alcohol reduces anxiety, helps the writer to study other people, can reduce "inhibitions" when one reaches an "impasse," good ideas may occur during "the good hangover," induce relaxation after sustained effort, a protection against too much creativity, the bohemian tradition, incompatibility of drinking and writing. In a biographic work Pedersen (Pedersen, 1991) has studied a group of Norwegian writers who were known to consume a large quantities of alcohol. He claims that these writers were vulnerable people with a strong need of self-exposure. Pedersen hypothesizes that there are five interacting factors making writers easy victims of alcoholism: (a) the solitude/isolation of the writing-process, (b) the strain inherent upon entering and exiting the world of fiction, (c) anxiety and personal discomforts, (d) the part alcohol plays in the creative process, (e) the writers' participation in a wild-night life, the bohemian tradition.

The second factor, i.e. dynamics of fiction writing, is related to the need of restitution and is a part of the creative process. What remains are four interacting factors which may explain why writers tend to have a higher consumption of alcohol than other professional groups. These four factors, i.e. solitude/isolation, anxiety, the creative process, and the bohemian tradition, illustrate the difficulties of studying alcohol's role in the creative process solely on the basis of interviews of individuals with creative occupations and the dependence on biographic studies. Furthermore, it is difficult to extrapolate these

results to a wider population. Therefore, the experimental approach seems essential for making further progress in research about alcohol and creativity.

THE COGNITIVE STYLE PERSPECTIVE

Nietzsche's (1872/1987) formulations on the *Dionysian* principle of bubbling liveliness and the *Apollonian* principle of form and order are sharp reminders of the concepts of *primary* and *secondary* processes that emanate from psychoanalytic terminology, where primary stands for the original, unconventional, based on instinct and unconscious, while secondary is associated with studied, logical, analytic, conventional, preconscious and conscious. Freud (1923/1966) regarded the primary and secondary processes as two different kinds of mental processes belonging to two completely separated systems, the conscious and the unconscious or ego and id.

The orthodox psychoanalytic conception of primary and secondary processes has been criticized by more recent psychoanalytic authors (Klein, 1961; Arieti, 1966, 1967; Noy, 1969). Noy (1969), for example, suggests that in studying artistic patterns of creativity one never finds this distinct division within two completely separated organization levels, but rather one obtains a special combination of the two processes. Noy also suggests that the division itself into conscious and unconscious is incomplete, considering Kris' theories (1952) regarding the preconscious and the regression in service of the ego. Noy suggests that the term "feedback" may be used as a criterion to define the two processes. With the support of Goldberger's experiments in sensory isolation (1961), he states that secondary processes are dependent on reality contact for their maintenance. Noy distinguishes two streams of information, one from reality and the second from feedback of mental functions. By continuous matching these two sources of information, the secondary processes are monitored and maintained in their functioning with relation to reality. This reasoning leads to the definition: "secondary processes are all mental processes dependent on feedback for their maintenance; primary processes are all mental processes not dependent on feedback for their maintenance" (Noy, 1969, p.166).

Neisser (1967) defines the concept of "cognition" as a behavioral type that "refers to all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in

images and hallucinations" (Neisser, 1967, p. 4). His definition implies that both the secondary and primary processes should be included in the concept. Neisser postulates too, similar to Noy, that the two processes are in no way antagonistic to each other, in the manner propounded by Freud, but rather are essential to each other. According to Neisser, secondary processes sometimes elaborate primary process material which may have major repercussions for creativity.

Hilgard (1968) postulates that primary and secondary thought, or non-directed fantasy and directed attention, may be considered two alternative states of awareness and concurrent processes and differentiates between (a) *fusion*, where both types of thought process are "fused" in differing proportions, and (b) *oscillation*, "quick shifts", where each part remains distinct and intact. Singer (1974) has implied that fantasy provides a continuous background to everything one endeavors, but that this is noticed first after attention upon the outer sources of stimulation begins to rescind.

Martindale (1975) developed a computerized system of content analysis the Regressive Imagery Dictionary (RID), which measures the amount of primary process content in a text. It is assumed that an individual's state of consciousness is reflected by speech construction. RID has been validated through studies that apply the child's spontaneous fantasy narratives, verbalizations of psychotic, as opposed to nonpsychotic patients, psilocybin and marijuana users (Martindale & Dailey, 1996). Further, it was found that there was a greater degree of primary process-orientation with participant displaying more right-hemisphere electroencephalographic activity (Martindale, Covello & West, 1986).

There are other physiological correlates of creativity. Thus, it has been indicated that participants scoring high on a variety of creative measures manifested a greater heart-rate variability than did uncreative participants (Bowers & Keeling, 1971), verified recently by Norlander, Bergman and Archer (1997). Following a perusal through the research, Suler (1980) drew the conclusion that greater heart-rate variability in creative participants indicated their rapid cognitive shifts between reality-oriented cognition and more imaginal, inner-directed ideation. With these and other studies in mind, Suler concluded that: "Creative people should possess an above average ability for shifting between states of low arousal associated with primary process and higher states of arousal characterized by secondary process" (Suler, 1980, p.158).

Notions of primary-secondary process may be compared with Bergström's (1990) view of human brain function modulating interplay between disorder and order, chaos and ordered knowledge. Accordingly, brain function is controlled by two "generators". One obtains its power from the vegetative region and the other from our physical environment. The first generator consists of the primitive brainstem. Bergström terms this the *random-generator*, because it transmits signals in a disordered, randomized way. The other generator, the highly developed cerebral cortex, he calls the *knowledge-generator* because it transmits signals ordered in an informative structural way. Despite the relatively structure and function of the brain, it performs a crucial role in regulating consciousness, as well as respiration and cardiac function. The flow of information from the knowledge-generator is implicit (without awareness) until it is met by the stream of information from the brainstem.

The two generators are postulated to function in a Darwinian manner. Thus, the information produced by the knowledge-generator is subject to random alterations because of the signal-streams from the random-generator. Therefore it is possible for the brain to maintain a continuous transformation of knowledge, which produces new, unpredictable knowledge (compare with Darwin's concept "mutations" and with that of "variation and selection"). Bergström calls this "true creativity" since the new knowledge can not be derived from the old one, and thus requires the formation of new, neurobiological entities.

THE EXPERIMENTAL RESEARCH SITUATION

There have, quite surprisingly, been only a few experimental studies aimed at the subject of alcohol and creativity. It has been decided to organize these into three categories of experiments directed at the study of the influence of alcohol upon: (a) associative functions, (b) primary- and secondary-processes, and (c) five phases of creativity.

Influence of Alcohol upon Associative Functions

One line-of-approach has been to examine the influence of alcohol upon idea-associations. In an early study of this nature it was reported that these associations become "weaker and follow the law of path of least resistance" (Jellinek & McFarland, 1940, p. 358). Later, Hartcollins and Johnson (1956) found that if the number of idea-associations significantly increased, it did so at the cost of quality and objectivity. Nash (1962) found that at moderate levels of alcohol intake (BAL [Blood Alcohol Level] < 0.09%) significantly increased verbal availability.

Hajcak (1976) performed an experiment whereby male students were allowed to drink alcohol *ad lib.*, which consisted of allowing them to consume in relaxed surroundings in a self-chosen manner. All participants were tested under the influence or when sober, i.e. taking into account the possible role of state-dependency. Tests that were used included originality (Kent-Rosanoff Word Association Test), fluency (Alternate Uses Test) and creative problem-solving (Remote Association Test). Participants showed significantly more originality but fluency and creative problem solving ability were diminished. Koski-Jännes (1983) reported the results of a study designed to measure the amount of idea flow (fluency) in the course of a divergent problem-solving. She observed that participants produced significantly more solutions but that the level of these had deteriorated, under alcohol influence, so that they were adjudged inadequate.

Lang, Verret and Watt (1984) used a balanced placebo design and after drinking, the participants carried out four ten-minute creativity tests (Torrance Test of Creative Thinking). In this study, a low dose of alcohol (0.6 ml alcohol/kg body weight) did not seem to affect the creative processes. However the participants who thought they had drunk alcohol, whether they had or not, evaluated their results more highly than the others. A similar investigation with a balanced placebo design and with low doses of alcohol (BALs of 0.02% and 0.04%) was conducted by Lapp, Collins and Izzo (1994). The results showed no pharmacological effect of alcohol on the creative combinations participants had to produce but the novelty of the arrangements were enhanced when participants thought they had consumed alcohol whether they had or not.

Gustafson (1991) found that both alcohol- as well as placebo-group participants produced significantly less solutions to a figural divergent test which was evaluated in reference to fluency. Brunke and Gilbert (1992) conducted an experiment utilizing a repeated-measures balanced-order design that tested the amount of metaphor usage in associations from a picture. The results indicated significantly greater quantity in the alcohol condition as compared with the placebo condition. Finally Lowe (1994) conducted an experiment, utilizing a repeated-measures, balanced-order design, that tested the effects of alcohol on creativity as measured by verbal forms of the Torrance Test of Creative Thinking. No significant differences were obtained between the alcohol and placebo groups in that

Influence of Alcohol
on Primary and
Secondary Processes

study, but there was a slight indication of enhancement in the placebo condition with less creative participants compared to decrement in more creative participants. However, in view of the serious paucity of control conditions both Brunke and Gilbert (1992) and Lowe (1994) defies interpretation.

An investigation made by Kalin, McFarland and Kahn (1965) seems to indicate that the primary processes develop at the expense of the secondary processes of young men in connection with alcohol and Thematic Apperception Test (TAT). It was observed that during social drinking remarks about the meaning of life and significant experiences were made more frequently after a "couple of drinks," while topics of conversation regarding sexuality and aggression were raised more often after higher consumption, at the same time as such considerations as anxiety, fear, and the "grip-of-time" started to dissolve. Kastl (1969), who has also applied the TAT-test, postulated that he could not find any trace of alcohol having affected tendencies of participants to show altered predilections, e.g. towards sexual or aggressive material.

Wilsnack (1974) found that social drinking significantly increased the emotional warmth and femininity of the female participants' responses on the TAT-test at the same time as power-fantasies diminished. In the male participants, there was a significant increase in power-fantasy during intoxication. Thus, alcohol seems to have produced the effect of reinforcing gender roles. There may be evidence to suspect the involvement of expectancy factors but Wilsnack's result can also be interpreted in terms of a primary process-orientation during intoxication. Gustafson and Källmén have in two different studies applied to either men (1989a) or women (1989b) analyzed the effects of alcohol regarding cognitive style. As an instrument the Street Gestalt Completion Test was used and evaluated in reference to the primary and secondary process. The experiment showed that a moderate intake of alcohol altered the balance between primary and secondary processes. The secondary function decreased while the primary function remained unchanged. Alcohol significantly reduced the ability to reproduce incomplete visual material but did not influence the ability to produce fantasy interpretations. The result was therefore a relative amplification of the primary process.

Koski-Jännes and Määttänen (1982) have employed, in a study Uznadze's (1966) division into unconscious "set"-conditioned and conscious objective-based processes. Accord-

ing to this present account, it is hypothesized that the “set-conditioned processes” refer, in most respects, to the primary processes whereas the “objective-based processes” refer to the secondary processes. Koski-Jännes (1983) summarizes the results of the investigation in the following manner: “Even if a mild or moderate intoxication limits the function of conscious processes it seems not to limit the intuitive, set-conditioned processes. These processes (i.e. set-conditioned processes/the primary process, according to present author) are highly sensitive to situational factors. Generally, these may be identified by their stereotypic nature but under suitable conditions even by an elevated originality” (Koski-Jännes, 1983, p. 155).

Some Comments
on the Two Old
Approaches

The above review demonstrates opposing results, especially with regard to the first category, i.e. the impact of alcohol on associative functions. This circumstance could be due to certain factors: (a) that the experiment situation measured different types of creativity. In the same way as the concept of IQ may be divided into different components, such as memory, perception, logical ability where participants often score differently on the different sub-tests, a similar situation exists in conjunction with the concept of creativity. It may even be the case that (b) two different and divergent tests postulated to assess the same characteristic (e.g. fluency) may not be comparable since these may be separated with regard to test material characteristics (content) and construction (product), or that (c) the items included have a tendency to generate either more obvious or remote associations (Fulgosi & Guilford, 1968) during alcohol intoxication, which highlights the desirability of qualitative analysis of associative functions, (d) experiences and accomplishments each participant brings to the experimental situation may vary. Some observations (e.g. Tarter, Jones, Simpson & Vega, 1971; Huntley, 1974) seem to indicate that a moderate dose of alcohol does not influence old skills but in terms of new or not-trained assignments there is a rapid deterioration. (e) Dose level: most studies apply a moderate dose of alcohol (about 0.08% in blood alcohol level), but some have a low dose of alcohol (0.05% and less). It seems as low dose levels do not show pharmacological effects on the creative process. Finally, another factor of importance may be (f) that the investigations measure creativity in its different phases (Norlander, 1992; Norlander & Gustafson, 1993; Norlander, 1995; Norlander, 1997).

INFLUENCE OF
ALCOHOL UPON THE
FIVE PHASES OF
CREATIVITY

Gustafson and
Norlander (1994)

A new approach (Gustafson & Norlander, 1994; Gustafson & Norlander, 1995; Norlander & Gustafson, 1996; Norlander & Gustafson, 1997; Norlander & Gustafson, 1998) pertains to the process model of creativity (Wallas, 1926/1970) with the addition of a fifth phase, restitution (Koski-Jännes, 1985; Norlander, 1992; Norlander & Gustafson, 1993; Norlander, 1995). These studies of the influence of alcohol upon the five phases of creativity provide new evidence upon previously research on alcohol and associative functions. Concurrently, it may be possible to integrate the more constant stream of evidence from studies on the influence of alcohol upon primary and secondary processes (see below).

The aim of the study was to explore the effects of moderate alcohol intoxication on the ability to reason deductively and on demonstrated persistent effort. Both deductive reasoning and persistent effort are relevant to the preparation phase (Guilford 1967b). The forty-two participants were randomly assigned in equal numbers (seven men and seven women) to one of three experimental groups, namely, an Alcohol group, a Placebo group, and a Control group. The alcohol drink contained 1.0 ml of 100% alcohol/kg body weight. Dependent variables were deductive thinking and persistent effort. Two tests were used, namely, *Syllogisms I* (Holmquist, 1974) for the deductive reasoning and the *Persistent Effort Test* (Gustafson & Norlander, 1996) for the persistent effort.

It was indicated that the Alcohol and Placebo groups were impaired with respect to persistent effort and that the Alcohol group also was impaired with respect to deductive reasoning, which may reflect a neuropharmacological effect. The reduced persistent effort seems to be partly an effect of expectancies, since both the Alcohol and the Placebo groups spent less time on task assignment than did the Control group. These data suggest that at least some of the preparation phase processes are significantly obstructed by a moderate dose of alcohol and so the necessary basis for further creative work during the later phases is weakened.

Gustafson and
Norlander (1995)

The purpose of this study was to test whether creative work, compared to non-creative work, produces a greater need for restitution as reflected in the tendency to drink alcoholic and non-alcoholic drinks and to explore whether there were any differences between hard and light creative work in this respect. The forty-two participants were randomly assigned to one of three equally sized and equally sexed groups, namely, (a) hard creative work, (b) light creative work, and (c) hard non-

creative work. The independent variable was Type of Work and the three dependent variables were: Favorite Beverage, Amount of Beverage Drunk, and BAL (measured via an alcometer test).

The results showed that participants performing hard creative work consumed more of the alcohol and placebo beverages than participants performing hard non-creative work. Participants carrying out light creative work consumed more of the alcohol beverage than the group with hard non-creative work. However, there was no difference obtained between the hard and light creative work groups. The results were interpreted as supportive of the hypothesis that creative work may be exceptionally strenuous and, in terms of the phases of creativity, may induce a greater need for restitution. Thus, there appears to be an expectancy that alcohol may ease and accelerate the restitution phase.

Norlander and
Gustafson (1996)

The purpose of the study was to explore whether or not a level of moderate alcohol intoxication facilitates the incubation phase. Sixty participants were randomly assigned in equal numbers (ten men and women) to one of three experimental groups: a Control, a Placebo, and an Alcohol group. Each participant received two bottles containing: In the control group, tonic water; in the Placebo group, tonic plus vodka essence and, in the Alcohol group, 1.0 ml of 100% alcohol per kg body weight given in the form of vodka mixed with an equal volume of tonic water. Three records were obtained for each participant: (a) the original report, (b) the diary and (c) the final report. Three panels of scorers were constituted.

Participants visited the laboratory twice. Each participant was given the instruction to speak aloud for about five minutes while planning an experiment to investigate the relative importance of heredity and environment. After that the participant was presented with a small, pocket-size notebook and given the instruction to continue to think about the problem until the experiment was closed. Further, the participant received the two bottles with the instruction to drink all the liquid in one of the bottles before going to bed in the same evening, and the content in the other bottle before going to bed next evening.

It was indicated that the participants in the Alcohol group accumulated significantly more incubations in the Diaries and scored significantly higher on originality in the Final reports as compared to the Placebo and Control groups. There was, however, no difference between groups regarding the scientific value of the Final reports. The results were interpreted as

Norlander and
Gustafson (1997)

an indication that a moderate dose of alcohol may facilitate the incubation phase of creativity.

The purpose of this study was to explore whether moderate alcohol intoxication would, as hypothesized, obstruct the creative processes during the verification phase. Forty-two participants were randomly assigned in equal numbers (seven men and women) to one of three experimental groups: a Control group, a Placebo group, and an Alcohol group. The participants in the Alcohol group each received 1,0 ml 100% alcohol/kg body weight.

The participants were presented with a very descriptive poem. First, the participant was instructed to consider how a picture should look in order to envision a particular poem. After that the participant was instructed to draw a sketch from the poem. Then the participant received the assigned drink. After drinking the participant was then presented with twelve coloring pencils and instructions for turning the sketch into a finished picture.

Results indicated that participants in the Alcohol group scored lower on "handicraft" as compared to both the Placebo and the Control groups and further the Placebo group scored lower on "handicraft" as compared to the control group. This pattern of results was interpreted as an indication that a moderate dose of alcohol deteriorated the relevant abilities and qualities in the verification phase of the creative process. The results for the Placebo group indicated that not only pharmacological effects were present but that there was also present a strong "expectancy" variable that could be traced.

Norlander and
Gustafson (1998)

The purpose of the study was to explore whether or not moderate alcohol intoxication facilitates the illumination phase. It seemed reasonable to postulate that, of the associative functions, *fluency* (i.e. total number of relevant responses) may be related directly to the illumination phase. It is possible that certain flow-components are reinforced whereas others are weakened under alcohol influence. Twenty-one Swedish authors took part in the experiment. They were matched against twenty-one non-authors of comparable age, weight and gender. Participants were randomly assigned in equal numbers (seven writers and non-writers) to one of three experimental groups, namely, a Control group, a Placebo group, and an Alcohol group. Alcohol group (i.e., 1.0 ml of 100% alcohol per kg body weight)

As a measure of creativity, a shortened Swedish version (Holmquist, 1970) of the Purdue Creativity Test was applied.

The shorted version (PUKORT) has ten items, each pertaining to one or more imagined object(s) and the participants' task was to describe as many different ways to use the objects as possible. Scores on fluency, flexibility, obvious, and original were obtained.

The experiment produced three main results: (a) the Alcohol group scored lower on flexibility compared to the Placebo group and (b) higher on originality compared to the Control group and (c) authors and non-authors reacted in a similar manner to a moderate dose of alcohol. The results were interpreted as an indication that a moderate dose of alcohol may both inhibit or facilitate different functional components during the illumination phase of the creative process.

DISCUSSION The empirical material remains, through force of circumstance, neither large nor homogeneous. The nature of the problem requires many more studies before any definite conclusions can be drawn about the mechanisms involved in creativity following alcohol intake. However, it is already possible to ask some relevant questions and then study the preliminary answers, given the background of present results.

Why are Writers
Often Large
Consumers of
Alcohol?

Referring to the notion (Pedersen, 1991) that there are at least four important co-operating factors to account for the high alcohol consumption among writers (solitude, anxiety, the creative process, Bohemian tradition) it is not possible to give any specific answers. One may attempt to provide avenues that may lead towards possible mechanisms that presumably exist within the creative process.

Preparation. According to Wallas (Wallas, 1926) this phase stretches over the entire intellectual education and is a reminder of Hobbes' terms "regulated thought" (the educated scientist) opposed to "wild raging of the mind" ("ordinary" persons' thinking). Maslow (1968) implies that successful creativity demands contribution from both the primary and secondary processes in a balanced manner and with appropriate order. Such creativity is referred to by Maslow as "integrative creativity." Secondary processes are assumed to involve the learned, logical, analytical, conventional, preconscious, and/or conscious processes. It is reasonable assume that alcohol, dose-dependently, complicates functioning of these processes, inducing susceptibility to dysfunction.

Motivation and intensity are especially important qualities during the preparation phase (Guilford, 1971). Alcohol-abusers often demonstrate a tendency to act impulsively (Patterson,

Charles, Woodward, Roberts & Penk, 1981), possibly for immediate satisfaction of their needs or revealing a lack of persistence. The impulsive-tendency in turn may produce an expectancy, i.e. alcohol decreases the persistent effort. In the experiment regarding the preparation phase (Gustafson & Norlander, 1994) the participants' (who were "social drinkers") persistence decreased with alcohol or placebo intake.

Incubation. Often artists/authors are reported to use alcohol in order to "loosen" up when they "got stuck" or to work during the "good hangover" (Norlander & Gustafson, 1993). This effect concerns the drinking of alcohol before the actual writing which matches the incubation.

Regulated thought is necessary during the preparation phase, but may be a burden during incubation. "Brain-storming" and similar techniques are supposed to be as unregulated as possible, reminiscent of the "wild raging of the mind". According to Bergström (1983), the knowledge-generator (i.e. cortex) is not readily disturbed by alcohol consumption during the preparation phase. During the incubation phase, however, it may be an advantage if order and logic are required to remain in the background and therefore it may be possible that the presence of alcohol contributes towards release of the "thought-flow".

Maslow (1968) mentions, in addition to "peak-experience," the need to have a "right-here-right-now" feeling directly before the actual experience without extraneous considerations of the future or the past. Additionally, alcohol may, if the primary process is strengthened on behalf of the secondary process, facilitate the "right-here-right-now" experience, or, in psychoanalytic terms, "a lack of wariness" or "forgetfulness" of the ego.

Bergström (1983) hypothesizes that alcohol weakens the knowledge-generator and subsequently the, evolutionarily, more primitive brain regions of the brain modulate control over behavior (compared to primary process thinking). At this stage, fragments of knowledge and ideas not fully selected in accordance with the selection-pressure appear. The ruling principles of selection were similar to those derived for the knowledge-generator, whose effect now is weakened, and perhaps even repressed. One consequence of this cascade of events may be release of more creative expressions, especially in those individuals who normally possesses this ability. With other individuals (note that this situation may even occur in the same individual), it may lead to unpredictable, uncontrollable and/or violent, destructive and antisocial behavior. In the study

regarding the incubation phase (Norlander & Gustafson, 1996) it was demonstrated that alcohol consumption immediately before retiring to bed produced a greater number of incubations and a higher degree of originality was registered.

Illumination. It is reasonable to assume that certain aspects of research pertaining to associative functions may be directly coupled to the illumination phase, particularly regarding fluency and flexibility. For originality it seems there are reasons for assuming the influence of the incubation phase (Norlander & Gustafson, 1996) whereas elaboration has usually been placed in the verification phase (Guilford, 1967b; Norlander & Gustafson, 1997). The particular research centered upon the influence of alcohol on idea-associations has generated several conflicting results (see section on The Experimental Research Situation).

Maslow (1968) claimed that new ideas and creative work demand strong impulses from the primary process. Insight implies that the consciousness has the propensity to “reap” activities mainly from the primary process, but also, as Kris (1952) and Kubie (1958) claim, from the secondary process during the preconscious phase. It is during the preconscious phase that it is finally decided which lines of thought will reach consciousness and be manifested as insights. Since there is a high degree of ongoing activity from both the primary and secondary processes during the illumination phase, and in varying combinations, the influence of alcohol during this phase is difficult to predict.

A study of some of the components of idea-associations as well as the manner in which they are treated in certain studies may provide some guidance: Alcohol seems to contribute to a weakening of the secondary process (Kalin, McFarland & Kahn, 1965; Koski-Jännes & Määtänen, 1982; Gustafson & Källmén, 1989a; Gustafson & Källmén, 1989b) and unrefined primary process material may then reach consciousness in the form of ideas that are considered inadequate (Jellinek & McFarland, 1940; Hartcollins & Johnson, 1956; Koski-Jännes, 1983) or as original (Hajcak, 1976; Koski-Jännes & Määtänen, 1982; Norlander & Gustafson, 1996, Norlander & Gustafson, 1998). Another effect of a weakened secondary process following alcohol intake may be the accomplishment of some form of “tunnel-vision” (Pernanen, 1976), i.e. a greater incidence of one-sided associations, as has already been reported (Jellinek & McFarland, 1940). This effect was demonstrated also for the alcohol group by Norlander and Gustafson (1998), as with the

reduced flexibility of the participants, both authors and non-authors. Guilford (1967b) distinguishes between three types of flexibility: flexibility with respect to classes, flexibility with respect to transformations in divergent-production activities (adaptive flexibility) and, finally, flexibility with respect to transformations in connection with convergent production. In the study performed by Norlander & Gustafson (1998) it is the flexibility of classes that is relevant. This factor has been termed “spontaneous flexibility” also (ibid) since the participant was not specifically asked to be flexible but did so on his/her own initiative. The essence of this type of flexibility is “the ready shifting from class to class in searching for information” (Guilford, 1967b, p. 325) and it constitutes, according to Guilford, a critical component of creative problem-solving. This observation may be compared with reports concerning the disruptive effects of alcohol upon creative problem-solving (Hajcak, 1976).

Verification. Most artists/authors studied denied alcohol consumption during actual performance (writing, painting, and so on) of artistic work (Norlander & Gustafson, 1993), i.e. verification, fitting Wallas’ comparison to the preparation phase, where the work must follow certain rules and be controlled. Alcohol intoxication, by itself, ought to make such control harder to achieve.

Bergström (1983) seems to agree with this standpoint when he states that alcohol weakens cortical control over underlying brain regions, evidenced as a weakening of conscious behavior control and leading to a functional decrement of the knowledge-generator. Conscious programs and the brain’s lasting, steady information can not work at full effect, which in this situation may mean that alcohol deteriorates “handicraft-skills.” Handicraft-efficiency provides an integrated exercise during elaboration and revision (i.e. the verification phase) in the creative process (Norlander & Gustafson, 1997). Without handicraft-efficiency it is unlikely that the creative intention-expression may be manifested in either the author, artist, or concert-pianist.

Restitution. Restitution-need offers an interesting comparison in terms of Bergström’s neurophysiological perspective. He claims that the brain not only maintains a creative propensity, but also a destructive one (Bergström, 1990). A new thought in the brain implies that often other (older) thoughts must be rejected, possibly after scanning. Thoughts and ideas do have neurophysiological counterparts, ultimately in the form

of supremely complex concatenations of EPSPs/IPSPs, action potentials and neurotransmitters. Alteration of an idea does not necessarily imply only the reconstruction or new construction of existing neurological structures/events but also the resynthesis or destruction of the original entities. All of this requires neural activity and is, of necessity, energy-consuming. Bergström calls this the *creativity-catastrophe-machine*. It means that a “spiritual, psychological achievement is not only an abstract phenomenon, but also a consumption of the brain’s resources” (Bergström, 1990, p. 90). He mentions also the so-called “burn-out” phenomenon as a singular example of the uneconomical use of the “creativity-catastrophe-machine.” Burn-out is a reaction to extreme, chronic stress that amongst other effects degenerates creative performance and by which a previously enjoyable-desirable activity is rendered aversive. The result may incorporate a spiritual fatigue with the inability or reduced ability to demonstrate creative thinking. Ironically, highly dedicated and gifted individuals have shown greatest susceptibility to burn-out in response to a traumatic and chronic situation (Pines & Aronsson, 1981).

This point-of-view may explain why persons with creative jobs may evidence a greater restitution-need than others with intellectually less-demanding professions (Ludwig, 1990). The former group are “forced” to be creative on request and are not always allowed sufficient recuperation. It is also likely that the more creative a person is, or is forced to be, the greater the restitution-need (compare with Guilford’s well-known thesis: the degree of creativity is in direct proportion to the degree of novelty) of this individual. Achievement-need too bears a strong relation to the creative professions (cf. Heckhausen, 1991); this latter need would constitute a self-generated dimension modulating restitution. In this present Western high-tech industrial culture it is tempting to resort to alcohol consumption to accelerate the restitution process when “under strain” (Salaspuro, 1978). Furthermore, one may obtain one explanation of some of the results in the restitution experiment (Gustafson & Norlander, 1995), namely that both the group with a difficult creative task as well as the group with an easy creative task consumed more alcohol than the group with a hard non-creative task.

CONCLUSIONS In studies of alcohol and creativity we have found a pattern indicating that a moderate intake of alcohol makes the preparation phase more difficult (Gustafson & Norlander,

1994), the incubation easier through the effects of more incubations and increased originality (Norlander & Gustafson, 1996), decreases flexibility but increases the originality during illumination (Norlander & Gustafson, 1998), complicates the verification phase (Norlander & Gustafson, 1997) and facilitates restitution (Gustafson & Norlander, 1995). These findings are consistent with a biographical study of sixty Finnish authors (Koski-Jännis, 1985) where the material seems to indicate that excessive use of alcohol occurs mostly during the incubation and restitution phases. Only two writers declared they were drinking regularly during the verification phase while several writers stated specifically that they could not write under the influence of alcohol. These findings are also consistent with Hajcak (1976) with regard to elevated originality and lowered creative problem-solving ability (since as evident the flexibility of classes provides an important component of problem-solving ability). Regarding fluency, an important ability during illumination, conflicting experimental results suggest the fluency is not influenced by a moderate dose of alcohol (Lang, Verret & Watt, 1984; Norlander & Gustafson, 1998), that it increases (Koski-Jännes, 1983) or decreases (Hajcak, 1976; Gustafson, 1991). These conflicting results emphasize the necessity of analyzing the components of fluency (Norlander & Gustafson, 1998). Further studies of this type can channel the opposing evidence to provide different combinations of primary and secondary processes. Only a single study (Norlander & Gustafson, 1998) has assessed the influence of alcohol upon originality and “spontaneous flexibility” (flexibility of classes) but one may hypothesize that originality relates to primary whereas flexibility of classes to secondary process. Possibly a moderate dose of alcohol reduces the flexibility of classes as simultaneously more remote associations increase. These remote associations may be experienced inadequate (Koski-Jännes, 1983) or as original (Norlander & Gustafson, 1998). In this state fluency does not seem to be negatively affected by alcohol intake rather increasing or remaining unchanged. If the remote associations are missing for some reason (e.g. strong performance-needs) the consequent reduced flexibility may lead to reduced fluency.

According to the model (Norlander, 1997), preparation and verification phases occur during the secondary process, whereas incubation and restitution occur mainly during the primary process: in the context of the experiments described

alcohol deteriorates activities pertaining to the secondary process but facilitates those activities pertaining to the primary process. Supporting the premise that a moderate dose of alcohol disrupts the secondary process causing a cognitive shift to the advantage of the primary process (Kalin, McFarland & Kahn, 1965; Wilsnack, 1974; Koski-Jännes & Määtänen, 1982; Gustafson & Källmén, 1989a; Gustafson & Källmén, 1989b).

On the basis of these observations the following hypothesis has been formulated (Norlander, 1992; Norlander, 1995; Norlander, 1997): *a moderate intake of alcohol obstructs those phases of creativity that are mainly based on the secondary process (preparation, certain phases of illumination, verification), but facilitates those phases mainly based on the primary process (incubation, certain parts of illumination, restitution).*

It should be emphasized that large groups of the population are affected by the creativity process in their work situation. The accelerating transition to an information-based society entails new work-environment problems, that may relate, explicitly or implicitly, to the creative process. Sleep problems and inability to relax from “the job” may become markers for weariness of the creative process. The abuse stemming from an over-abundant consumption of alcohol may also provide an important marker. The need for a deeper and more sophisticated knowledge of alcohol’s effect on various psychological processes, e.g. the creative process, is increasing.

The intake of alcohol in connection with the creative process appears, to an overriding intent and purpose, to modulate the balance between the primary and secondary processes. Thus, alcohol consumption may reflect a desire to accelerate incubation or develop further original ideas that deviate from static frames of reference. The relaxation motive after a long, hard day’s creative pursuit has been discussed also, and, in this context as possible substitutes for alcohol in the creative process. The enterprise ends where it began — with the ancient Greeks. The Delphi oracle sought invariably to present only replies of the most exquisite ambiguity with the purpose of creating a “shock of reflection” to disrupt established patterns of thought and action in the audience. Pythia underwent her experiences in a “trance of enthusiasm” making available the burgeoning synthesis of Dionysian and Apollonian principle simultaneously. What are modern counterparts to oracular states of altered consciousness? Do they exist? Where does one search?

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