

The Geneva Appetitive Alcohol Pictures (GAAP): Development and Preliminary Validation

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Key Words

Alcohol · Pictures · International Affective Picture System · Addiction · Dependence

Abstract

This study describes a new database of alcohol-related pictures: The Geneva Appetitive Alcohol Pictures (GAAP). 60 alcohol-related pictures (beverages, drinking-related behaviors, alcohol-related cues) were presented to 101 participants (ranging from social drinkers to problem drinkers), who assessed them according to the classic emotional pictures validation provided by the International Affective Picture System (Center for the Study of Emotion and Attention (CSEA-NIMH), 2002). Participants were also screened with the Alcohol Use Disorders Identification Test. Normative ratings for valence, arousal and dominance of the pictures are provided separately for problem/risky users ($n = 49$) and non-risky drinkers ($n = 52$). The GAAP is a normative database that provides a large number of stimuli for investigators who conduct research on alcohol. Copyright © 2011 S. Karger AG, Basel

Introduction

A growing number of studies in addictions use substance-related pictures. These stimuli are applied in particular to the study of attentional bias [1] and substance-related cue reactivity (e.g. physiological activation) [2]. Nonetheless, numerous studies using substance-related pictures frequently select stimuli that have not received prior sufficient validation. In fact, these stimuli often come from various internet stock photography sources or are pictures taken by the researchers themselves without complementary validation procedures. Certain studies have selected their stimuli for specific ratings (e.g. pleasantness or attractiveness of the stimuli), but these ratings are frequently judged by a few experts (often the persons who designed the study or their close collaborators) or by small samples of participants or patients. Several studies, for example, have explored attentional bias or cue reactivity in substance abusers by using normative affective pictures unrelated to the substance (neutral, positive and negative pictures taken from the International Affective Picture System (IAPS)) [3] and non-normative substance-related pictures selected by the investigators [e.g. 4–6].

This tendency is not surprising, as the IAPS comprises only a few pictures related to specific substances (i.e. cocaine [# 9,101], heroin [# 9,102], alcohol [# 2,600, # 2,749] and tobacco [# 2,715, # 2,749]).

The first database to be developed comprising alcohol- and tobacco-related pictures was the Normative Appetitive Picture System (NAPS) [7]. Pictures from the NAPS have been validated for three dimensions: approach (defined as 'wanting to consume'), avoidance (defined as 'wanting to avoid consuming') and arousal (defined as 'feelings of calmness versus arousal') [8]. Unfortunately, the NAPS comprises only a relatively small number of different pictures per substance (e.g. 18 photos of alcoholic beverages, 6 photos related to tobacco). As a consequence, investigators who choose to use the NAPS generally have to add supplementary pictures (which raises the problems mentioned earlier concerning their selection method) to avoid multiple presentation of the stimuli [e.g. 9, 10]. Thus, although the NAPS can be considered as the first significant stage in the development of normative pictures for research in the field of alcohol and tobacco research, its limitations call for further standardized databases that include more stimuli for each substance. A few other studies have also proposed norms for substance-related pictures [e.g. 11, 12]. For example, Pulido et al. [12] developed a database of 28 pictures of alcohol beverages matched (in terms of valence, arousal, image complexity, brightness and hue) with 28 pictures of non-alcohol beverages. Nevertheless, alcohol researchers may also be interested in other types of stimuli, in addition to pictures of beverages, such as pictures featuring drinking behaviors (e.g. someone drinking) or alcohol-related cues (e.g. a corkscrew).

The aim of the present study was to develop and validate a database specifically devoted to alcohol-related research: the Geneva Appetitive Alcohol Pictures (GAAP). The GAAP contains 60 alcohol-related pictures subdivided into three types: (1) beverage pictures, (2) drinking behaviors, and (3) alcohol-related cues. To validate the GAAP, we applied the emotional pictures validation procedure provided by the IAPS to our alcohol-related pictures. More precisely, this evaluation consists of a tridimensional assessment of the *valence* of the pictures (from positive to negative); their level of *arousal* (from active to passive), and their level of *dominance* (from submissive to dominant). This tridimensional assessment procedure has been successfully applied to a variety of emotional material (e.g. pictures, words, sounds) and is a well-established method for the development of affective pictures. The convergent validity of the pictures selected was also

considered by using a well-known questionnaire that assesses alcohol dependence: the Alcohol Use Disorders Identification Test (AUDIT) [13].

Methods

Participants and Procedure

The study included 101 Swiss and French participants (33 men, 68 women). Our aim was to include persons presenting various levels of drinking patterns, ranging from occasional or social drinkers to risky or problematic drinkers. To this end, the sample was composed of volunteer participants who drank at least once per week with either normal or risky drinking patterns ($n = 89$) and volunteer participants with alcohol dependence ($n = 12$) who attended a relapse prevention group. The participants were recruited via advertisement (e.g. at the University of Geneva) or by announcements made by the Swiss and French investigators of the study. The mean age of the sample was 27.30 years ($SD = 8.59$, range = 19–60 years), and the mean years of schooling was 15.06 ($SD = 3.23$). All participants gave their informed consent prior to their participation. After completing a general questionnaire about demographic data (age, gender, activity, years of schooling), participants were asked to assess 60 alcohol-related pictures (see the following subsection) and to complete the AUDIT. Participants were tested in groups of 3–15 participants. Several participants who were not available at the time of testing were tested individually in a laboratory. Informed consent forms were kept separate from the completed questionnaires to guarantee the anonymity of the participants. No compensation for participation was given. The entire experiment lasted about 1 h.

Alcohol-Related Picture Selection and Evaluation

The GAAP comprises 60 alcohol-related pictures selected from an original set of 200 pictures. Selections were made so as to avoid incorporating pictures that were too similar and to provide a database with a wide range of different alcoholic beverages and related stimuli. All pictures were taken by members of the research team. The 60 selected pictures are subdivided into three types: (1) beverages (pictures representing various types of drinks, e.g. beer, wine, hard liquor, cocktails); (2) drinking behaviors (e.g. people drinking, someone making a cocktail), and (3) alcohol-related cues (e.g. a corkscrew). Concerning pictures representing drinking behaviors, we took particular care to ensure that the facial expressions of the people involved are not visible to avoid any influence of their emotional expression on the pictures' ratings. Figure 1 depicts examples of pictures included in the GAAP. The Appendix includes a complete list of the 60 pictures with their type (beverages, drinking behaviors, alcohol-related cues) and the kind of beverages they represent (for pictures of beverages and drinking behaviors). The 60 pictures composing the GAAP are available as online supplementary material (online suppl. figures, www.karger.com/doi/10.1159/000328046).

The normative rating procedure used to validate pictures of the IAPS [14] was followed as closely as possible. Participants had to rate each picture one by one on the dimensions of valence, arousal and dominance using a pencil-and-paper version of the Self-Assessment Manikin (SAM) rating system [15]. Participants in the group sessions were seated from 2 to 4 m in front of a screen



Fig. 1. Sample pictures from the GAAP.

on which the pictures were projected (two to four rows of participants). To limit social conformity bias in group sessions, we took care that participants were not seated too near one another to prevent them from seeing their neighbors' responses. The size of the screen was identical for each group session. Participants in the individual sessions were seated in front of a computer in a quiet laboratory. The picture presentation was run with Microsoft PowerPoint. Participants were told that the study aimed to investigate their appraisal of alcohol-related pictures, and they were instructed to assess the pictures by using a rating form containing 60 sets of SAM figures. The investigators who conducted the various sessions (both group sessions and individual sessions) were trained to provide similar explanations about the experiment. Each set comprised three scales to measure the three dimensions of interest on a 9-point Likert scale (valence, arousal and dominance). The order of the three dimensions measured was randomized across trials. Prior to the assessment of the 60 pictures, instructions were given to clarify the meaning of the three dimensions. The valence dimension was said to vary from positive to negative feelings. More precisely, valence occurs on a continuum from feeling happy, pleased or satisfied on one side (a SAM with a smiling figure; score = 1) to feeling unhappy, annoyed or unsatisfied on the other side (a SAM with a frowning figure; score = 9). The arousal dimension was said to vary from aroused to unaroused. More precisely, arousal occurs on a continuum from feeling stimulated or excited on one side (an excited SAM with open eyes; score = 1) to feeling relaxed or calm on the other side (a sleepy SAM with closed eyes; score = 9). The dominance dimension was said to vary from submissive to dominant. More precisely, dominance occurs on a continuum from feeling influenced and guided on one side (a small SAM figure; score = 1) to feeling influential and in control in the other side (a large SAM figure; score = 9). Participants were asked to rate how they actually felt when seeing

each picture (not at the moment that they rated the picture after having just seen it). The rating procedure was as follows: (1) a forewarning slide with the instruction 'Prepare to rate picture X' was presented for 5 s, (2) after this period, a picture was presented for 6 s, and (3) after the picture was presented, a 10-second rating period began with the instruction 'Please rate picture X on all three dimensions'. Before starting the rating of the 60 pictures, the participants were provided with an example of the sequence along with commentary by one of researchers.

Alcohol Use Disorders Identification Test

The AUDIT [13] was originally developed under the auspices of the World Health Organization as a screening instrument for alcohol-related problems. The validated French version of the AUDIT was used in the present study [16]. The AUDIT is a 10-item self-inventory that measures individual differences in patterns of alcohol use (items 1–3), difficulties in managing impulses to drink alcohol (items 4–6), and alcohol-related problems (items 7–10). Eight items (1–8) are scored from 0 to 4. Items 9 and 10 are scored 0, 2, or 4. The maximum score of the AUDIT is 40. It has been widely used and found to have good validity and reliability (for the French version used in the current study, see Gache et al. [16]). According to normative data collected in Switzerland, problem/risky patterns of alcohol use are reflected by an AUDIT score of 6 or more for women and 7 or more for men [16]. The reliability coefficients (Cronbach's α) calculated on questionnaires with no missing data are excellent ($\alpha = 0.92$). The mean AUDIT score in the present sample is 9.03 (range = 1–35, SD = 8.48). From the normative data provided on a French-speaking sample by Gache et al. [16], the AUDIT scores in the current study characterized 52 participants (51.5% of the sample) as having non-risky drinking behaviors and 49 participants (48.5% of the sample) as having risky or problematic alcohol use.

Table 1. Valence, arousal and dominance statistics for risky and non-risky drinkers

Ratings	Risky drinkers (n = 49)				Non-risky drinkers (n = 52)				Benjamini-Hochberg comparisons
	mean	SD	max	min	mean	SD	max	min	
Valence	4.57	1.25	8.20	2.35	4.51	0.75	6.85	2.93	NS
Arousal	6.33	1.42	9.00	3.25	7.13	1.43	8.98	3.79	non-risky drinkers > risky drinkers
Dominance	6.81	1.39	9.00	3.33	7.72	1.22	9.00	4.80	non-risky drinkers > risky drinkers

max = Maximum mean for the group; min = minimum mean for the group.

Results

Descriptive statistics (mean, SDs, range) for the three types of ratings (valence, arousal, dominance) are reported in table 1 separately for risky drinkers and non-risky drinkers. In addition, the Appendix also provides normative data for the 60 pictures of the GAAP separately for risky drinkers and non-risky drinkers. Correlation analyses were computed between the various ratings of the pictures, revealing valence to be correlated with dominance, $r = 0.26$, $p < 0.01$, and with arousal, $r = 0.43$, $p < 0.001$, whereas arousal and dominance were strongly correlated, $r = 0.79$, $p < 0.0001$. No gender effect was observed, whether for valence $t(99) = 0.67$, $p = 0.51$; arousal, $t(99) = 0.36$, $p = 0.72$; dominance, $t(99) = 0.12$, $p = 0.90$; or total AUDIT scores, $t(99) = -1.05$, $p = 0.30$. Accordingly, separate ratings for males and females are not reported.

We then computed a 2 (risky versus non-risky drinkers) \times 3 (valence, arousal and dominance ratings) multiple analysis of variance. The main effect of the group was significant, $F(1, 99) = 7.01$, $p < 0.01$, as well as the main effect of the subjective ratings, $F(2, 198) = 274.53$, $p < 0.0001$. In addition, the interaction between group and subjective ratings was also significant, $F(2, 198) = 9.32$, $p < 0.001$. Post-hoc comparisons revealed that risky drinkers are significantly more aroused, $t(99) = -2.82$, $p < 0.001$, and dominated, $t(99) = -3.52$, $p < 0.001$, by the alcohol pictures than are non-risky drinkers. However, no significant difference was found in valence ratings, $t(99) = 0.28$, $p = 0.78$. For these latter analyses, comparisons were considered as statistically significant if $p < 0.05$, corrected for multiple comparisons using the Benjamini and Hochberg false discovery rate procedure [17]. The differences between risky and non-risky drinkers concerning the arousal and dominance ratings remain significant at the 0.05 level after this correction.

Discussion

The aim of the present study was to develop a database of 60 appetitive alcohol-related pictures based on the validation procedure of the IAPS. Compared with other databases such as the NAPS, the GAAP provides a larger number of pictures specifically related to alcohol. Moreover, the GAAP comprises various subtypes of alcohol-related pictures (different types of drinks, drinking-related behaviors, alcohol-related contexts and alcohol-related cues), which allows investigators to choose the most appropriate pictures for their research topic. Another advantage of the study is that it provides normative data for the pictures incorporated in the GAAP. Thus, investigators can select the stimuli they need on the basis of the valence, arousal or dominance properties (provided both for risky and for non-risky drinkers). In particular, selection of stimuli can be based on more than one rating, or on combinations thereof (e.g. a study requiring positive and arousing stimuli). Finally, subjective ratings of the pictures significantly correlate with drinking patterns as measured by the AUDIT, which supports their usefulness in further studies about alcohol use and misuse.

Arousal and dominance are strongly related dimensions, meaning that pictures that trigger elevated emotional arousal are also associated with low perceived control and submissive feelings. Furthermore, these two ratings were found to significantly differentiate risky and non-risky drinkers on the basis of their AUDIT scores (which was not the case for valence ratings). This latter finding is in accordance with previous results showing that alcohol cues provoked more arousal (assessed with physiological measures or subjective ratings) in heavy or problematic drinkers than in lighter drinkers [18–20].

This preliminary validation of the GAAP was conducted without alcohol-unrelated pictures, which could be a problem for studies needing control stimuli. Nevertheless, this problem can be addressed by using stimuli

from both the GAAP (the alcohol-related pictures) and the IAPS (for the alcohol-unrelated pictures), as the two databases have been validated with the same procedure. Indeed, several studies have already been conducted by combining self-made alcohol pictures and control pictures from the IAPS [e.g. 4–6]. However, for practical reasons, further validation of the GAAP will require the development and validation of alcohol-unrelated pictures. Another limitation to the study is the absence of a test-retest procedure, which implies that information is lacking for the stability of the subjective ratings. We also have to mention here that our sample is composed of only Swiss and French participants, which could be a problem, as the types of drinks favored vary across countries [e.g.

21]. Nevertheless, we think that the number of pictures composing the GAAP (60 pictures) and the variety of beverages available in our database allows researchers to choose which pictures are more suitable for them. The sample is also mainly composed of young adults, implying that our findings should be confirmed in samples of older adults. Finally, our validation procedure relies only on subjective evaluation and does not comprise psychophysiological measures of arousal (e.g. heart rates). Despite these limitations, the GAAP can be considered as a normative database of affective pictures, providing a large number of stimuli for investigators who conduct research on alcohol (e.g. cue reactivity, attentional bias).

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Appendix. Mean ratings and standard deviations for the 60 pictures of the GAAP

Picture	Type of drink	Type of picture	Risky drinkers (n = 49)						Non-risky drinkers (n = 52)					
			valence		arousal		dominance		valence		arousal		dominance	
			mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
1	Beer	Drinking	4.35	2.21	6.47	2.03	7.00	2.15	4.23	1.60	7.29	1.76	7.71	1.55
2	Sangria	Drinking	4.20	2.35	6.14	2.09	6.78	1.96	3.69	1.69	6.76	1.87	7.45	1.69
3	Wine	Beverage	4.42	2.18	6.75	2.13	7.40	1.70	4.17	1.75	7.27	1.82	8.00	1.48
4	Wine	Beverage	4.27	2.25	6.79	1.88	6.98	1.93	4.56	2.15	7.19	2.11	7.85	1.38
5	-	Related cue	2.98	1.88	6.96	1.87	7.65	1.90	3.25	1.66	6.87	2.24	7.87	1.76
6	Wine	Beverage	4.90	2.15	7.17	1.71	7.60	1.62	5.02	1.74	7.60	1.62	7.94	1.59
7	Alcopop	Beverage	4.94	2.66	6.53	2.06	7.14	1.98	4.04	2.13	6.35	2.26	7.35	1.81
8	Beer/wine	Drinking	4.12	2.33	5.78	2.20	6.57	1.94	4.62	2.04	6.72	2.29	7.30	1.97
9	Beer	Beverage	6.63	1.81	6.16	1.98	6.14	2.42	6.15	1.81	7.71	1.58	7.81	1.60
10	Hard liquor	Beverage	4.65	2.15	6.51	2.28	6.73	2.24	4.65	1.70	6.87	1.93	7.35	1.91
11	Hard liquor/beer	Beverage	5.22	1.95	7.22	1.79	7.49	1.61	5.08	1.61	7.73	1.50	7.83	1.62
12	Champagne	Beverage	3.65	2.23	5.55	2.39	6.06	2.19	3.25	1.49	6.27	2.43	7.48	1.82
13	Wine	Drinking	4.29	2.31	6.10	2.24	6.51	2.12	4.62	1.52	7.31	1.97	7.92	1.66
14	Beer	Drinking	3.88	2.46	5.73	2.46	6.82	2.30	4.44	2.29	6.44	2.22	7.85	1.51
15	Hard liquor	Beverage	4.69	2.00	5.86	2.51	6.49	2.26	4.88	1.54	7.19	1.84	7.67	1.57
16	-	Related cue	5.12	1.62	7.84	1.71	8.04	1.43	4.94	1.00	8.17	1.42	7.98	1.60
17	Beer	Beverage	4.18	2.48	6.27	2.46	6.90	2.21	4.94	1.87	7.40	1.83	7.94	1.74
18	Wine	Beverage	3.39	2.32	5.71	2.37	6.39	2.20	3.38	1.88	6.88	2.18	7.42	2.14
19	Cocktail	Drinking	4.20	2.31	5.29	2.43	5.92	2.38	4.02	1.95	6.44	2.50	7.50	2.09
20	Hard liquor	Beverage	5.14	2.26	5.84	2.49	6.12	2.55	4.92	1.64	6.85	2.06	7.40	1.85
21	Champagne	Beverage	3.06	1.97	4.73	2.56	5.84	2.51	2.96	1.45	5.73	2.51	7.38	1.71
22	Wine	Drinking	4.57	2.08	6.49	2.25	6.73	2.31	4.56	1.82	7.46	2.00	7.85	1.85
23	-	Related cue	5.12	2.00	7.24	2.02	7.43	2.18	4.79	1.26	7.71	1.85	7.73	1.87
24	Alcopop	Drinking	5.59	2.42	6.10	2.41	6.65	2.45	4.75	2.21	6.85	2.29	7.44	2.09
25	-	Related cue	5.12	2.05	7.35	1.79	7.96	1.46	5.25	1.40	7.83	1.34	8.08	1.40
26	Wine	Beverage	4.06	2.16	6.49	2.13	7.08	2.03	4.23	1.64	7.44	1.78	7.96	1.58
27	Sangria	Beverage	3.67	2.48	5.16	2.54	6.14	2.35	3.48	1.57	6.19	2.39	7.23	2.01
28	Cocktail	Drinking	4.16	2.39	5.35	2.63	5.84	2.66	3.94	1.93	6.12	2.78	7.27	2.07
29	Hard liquor	Drinking	4.47	2.44	5.69	2.69	5.94	2.72	4.43	1.90	6.29	2.35	7.62	1.73
30	Wine	Beverage	5.22	2.01	7.27	1.91	7.71	1.63	4.46	1.38	7.77	1.63	8.13	1.56
31	Alcopop/beer	Beverage	5.35	2.38	6.41	2.35	6.82	2.34	5.54	1.97	7.19	1.97	8.13	1.25
32	Cocktail	Drinking	4.51	2.36	5.96	2.56	6.41	2.42	4.52	1.97	6.81	1.99	7.60	1.76
33	Sangria	Beverage	4.55	2.24	6.27	2.08	6.73	1.98	4.00	1.57	6.92	2.03	7.63	1.83
34	Hard liquor	Beverage	6.02	2.31	6.69	2.26	7.27	2.33	5.94	1.54	7.51	1.90	8.08	1.51
35	Beer	Beverage	5.39	2.07	6.55	2.38	6.73	2.22	5.31	1.99	7.40	1.91	7.75	1.78
36	Wine	Drinking	4.49	2.12	6.61	2.00	7.29	1.94	4.38	1.86	6.96	2.07	7.71	1.66
37	Hard liquor/wine	Drinking	4.71	2.68	5.24	2.64	6.27	2.67	4.94	2.22	6.51	2.05	7.31	1.91
38	Wine	Beverage	4.35	2.37	6.69	2.15	7.14	1.98	4.60	1.55	7.44	2.03	7.92	1.74
39	Hard liquor	Beverage	5.06	1.91	6.33	2.15	7.04	2.16	4.96	1.63	7.63	1.68	8.12	1.26
40	Wine	Beverage	4.49	2.32	6.61	2.17	6.69	2.31	4.54	1.65	7.48	2.04	7.83	1.81
41	Cocktail	Beverage	4.96	2.40	6.45	2.34	6.76	2.02	3.65	2.01	6.27	2.28	7.44	1.96
42	Beer	Beverage	5.02	2.33	6.94	2.07	7.12	2.13	5.12	1.86	7.29	2.00	7.96	1.48
43	Cocktail	Drinking	4.12	2.24	6.06	2.26	6.90	2.08	3.67	1.68	6.79	2.25	7.54	1.99
44	Cocktail	Beverage	3.90	2.26	5.65	2.26	6.04	2.41	3.71	1.64	6.54	2.21	7.13	2.27
45	Hard liquor/wine	Beverage	4.86	1.96	6.51	2.12	6.65	2.14	5.17	1.42	7.56	1.63	7.77	1.74
46	Beer	Beverage	5.04	2.43	6.92	2.12	7.14	2.03	5.33	1.62	7.81	1.69	8.00	1.62
47	Wine	Beverage	4.41	2.22	6.67	1.93	7.33	1.72	4.85	1.75	7.69	1.71	7.98	1.50
48	Hard liquor	Drinking	5.33	2.57	5.84	2.72	6.00	2.78	4.90	2.26	6.62	2.14	7.25	1.98
49	Wine	Beverage	4.51	2.07	7.00	2.09	7.49	1.86	4.71	1.64	7.63	1.85	8.04	1.76
50	Champagne	Drinking	4.20	1.81	6.22	2.24	6.69	2.05	4.31	1.35	7.27	2.12	7.98	1.61
51	Cocktail	Drinking	4.82	2.08	6.37	2.28	7.00	2.03	4.81	1.95	7.35	2.06	8.00	1.73
52	Beer	Beverage	4.47	2.53	6.41	2.30	6.71	2.49	4.56	1.96	7.42	1.85	7.85	1.46
53	Wine	Beverage	4.49	2.12	6.41	2.35	6.73	2.17	4.38	1.67	7.54	1.72	8.02	1.53
54	-	Related cue	4.67	1.70	7.02	2.14	7.18	2.20	4.81	1.58	7.85	1.61	8.00	1.64
55	Wine	Beverage	4.29	2.18	6.71	2.20	7.14	1.97	3.96	1.56	7.54	1.69	7.79	1.66
56	Hard liquor	Beverage	4.86	2.34	6.20	2.56	7.02	2.38	4.60	2.14	7.46	1.75	7.73	1.75
57	Beer	Beverage	4.76	2.44	6.14	2.65	6.49	2.72	5.37	1.76	7.52	1.88	7.92	1.81
58	Beer	Drinking	4.27	2.42	6.27	2.30	6.82	2.46	4.79	1.85	7.46	1.90	7.94	1.55
59	Wine	Drinking	4.45	2.25	6.63	2.21	6.98	2.18	4.54	1.71	7.31	2.09	7.75	1.88
60	Sangria	Beverage	3.55	2.44	5.51	2.45	6.41	2.32	3.23	1.65	6.48	2.34	7.25	2.13