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## **Valence and arousal norms for Swedish affective words**

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### **Abstract**

Valence and arousal has been found to influence memory performance, both independently and in interaction with each other. In order to conduct studies measuring the effect of valence on memory while controlling for arousal, we aimed to develop a validated list of Swedish words that were all rated medium on arousal, while rated neutral or negative on valence. 131 participants rated 50 words each for valence and arousal. In total, 100 words were rated and are presented here together with two measures of how frequently they appear on blogs and newspapers respectively.

Emotional events are often better remembered than neutral ones. Emotional events however often differ from neutral ones in many ways and thus it is hard to determine what is the exact mechanism involved in this enhanced memory effect. Compared to neutral events, emotional events are often more unusual, distinctive, arousing and related to important life goals or events. This means that more attention is paid to them at encoding, and that they are thought about and rehearsed in a higher degree than neutral ones (Fox, 2008, pp.195).

The emotional value of an item is commonly classified along two dimensions: valence and arousal. An item that is high on valence is positive, pleasant or appetitive, while an item that is low on valence is negative, aversive and results in a defensive response. The arousal dimension describes the intensity of the activation that an item results in (Lang, 2010). Both valence and arousal seem to have independently enhancing effects on memory with a greater effect of arousal (Kensinger & Corkin, 2003). There are also interaction effects between arousal and valence, where the items that are best remembered are those that are both unpleasant and highly arousing (Kaestner & Polich, 2011). The enhanced memory effect of valence and arousal also seem to be based on distinct neural processes (Kensinger, Corkin & Raichle, 2004; Mickley Steinmetz & Kensinger, 2009). Valence and arousal have for example been showed to have different effects on the role of sleep in emotional memory (Kaestner, Wixted & Mednick, 2013) and to affect intentional memory suppression differently in a Think/No Think task (Marx, Marshall & Castro, 2008).

Emotional items often differ from neutral ones in both valence and arousal. This present study was conducted in order to create a validated list of Swedish words that were similar in

arousal and differed only in valence. The purpose of this was to have a word list to be used in studies measuring the effect of valence on memory while controlling for the effect of arousal. The aim of the study was to create two sets, one with words that were low on valence and medium in arousal, and one with words that were neutral both in valence and arousal.

## **Method**

### **Participants**

131 participants (38 men, 2 who did not mark a gender) were recruited. Participation was voluntary and no economic compensation was given. The mean age of participants was 24.73 years ( $SD=4,81$ ). 2 participants did not provide information about their age. Data was collected in classrooms in connection with lectures among psychology students at Lund University.

### **Procedure**

The authors selected 100 words from the Affective Norms for English Words (ANEW) (Bradley & Lang, 1999). The selection criteria were that the words were rated medium on arousal and either low or medium on valence. The words were then translated into Swedish by the authors. Two different lists were created, both included the same words but differed in the order the words were presented in. Each list was then divided into two different lists by counterbalancing the order of the words in each list. In order to reduce the length of the experiment so that the scale could be concluded during the break in the middle of the lectures to increase the response rate, each participant only rated 50 words each. Thus in total, there were 8 different version of the booklet that was handed out with different words and orders. Each word was rated by between 63-67 participants.

Participants were told that we were interested how emotional they considered different words to be, and that they would find additional instructions in the booklet. The instructions asked participants to rate a list of words based on if the words were negative or positive and if they were activating or de-activating on a scale from 1-9, using the Self-Assessment Manikin (SAM; Bradley & Lang, 1994). The instructions were freely translated from those used in Bradley and Lang (1999), and are provided in Appendix A.

## **Results**

The complete word list is presented in Appendix B. It lists information about valence and arousal as well as number of letters for each word. Additionally there are two measures of how frequently each word or a derivation of the word occurs in either Swedish language blogs or in the Swedish daily paper Göteborgsposten during 2012 respectively.

## **Discussion**

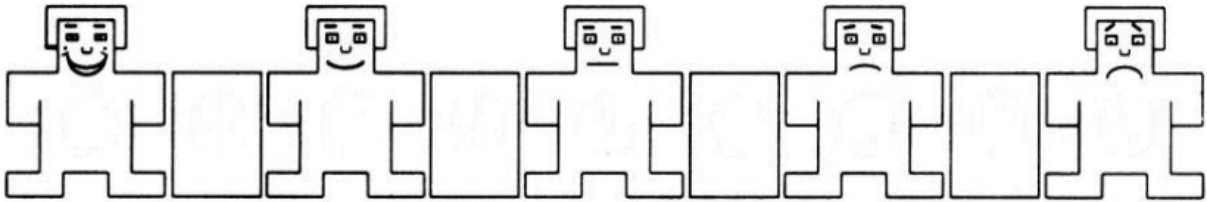
Having a validated list with valence and arousal ratings of word makes it possible to conduct research testing the individual contributions of these two dimensions in Swedish speaking samples.

One limitation with the study is that it contained only words that were expected to be neutral and negative. This can have resulted in different ratings of words than if they would have been encountered in a sample with a greater variety of valence. The standard deviations are also quite high, especially for arousal, which means that it could still be hard to predict if an individual participant will find a word to be of high or low arousal, especially when considered that the aim was to find words with average arousal.

## Appendix A - Instructions

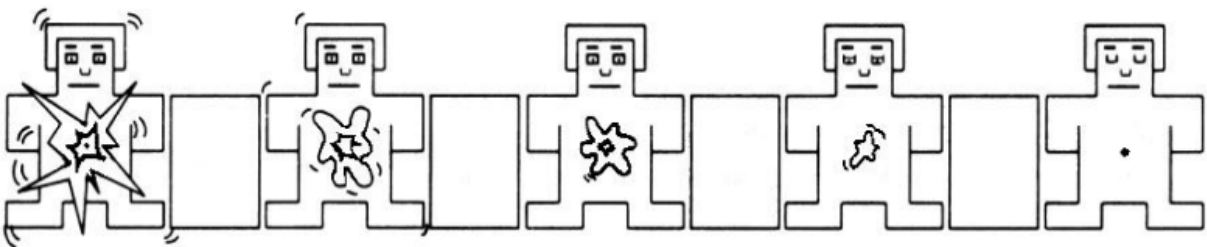
Vi är intresserade av vilka känslor människor förknippar med olika typer av ord. Du kommer att få en lista med 50 vanliga svenska ord. Efter varje ord kommer två uppsättningar av figurer. Dessa representerar olika känslotillstånd och ska användas för att visa vilka känslor du förknippar med ordet. Uppsättningarna av figurer representerar två olika typer av känslodimensioner. Notera hur dessa två känslotyper representeras med varsin skala.

### Valens



Den vänstra uppsättningen figurer visar valens-skalan, som går från ett leende till en sur min. Den vänstra änden av skalan representerar lycka, tillfredsställelse, glädje och hoppfullhet. Om du förknippar ett ord med fullständig lycka indikerar du detta genom att sätta ett kryss i figuren längst till vänster. Den högra änden av skalan representerar sorg, irritation, otillfredsställelse, melankoli eller hopplöshet. Om du förknippar ett ord med fullständig olycka sätter du ett kryss i figuren längst till höger. Du kan också indikera att du förknippar ordet med något däremellan genom att kryssa någonstans i mitten av skalan. Om du förknippar ordet med något fullständigt neutralt, varken sorg eller glädje, indikerar du detta genom att sätta ett kryss i figuren i mitten. Det finns 9 olika alternativ på skalan som du kan fylla i för att visa graden av lycka eller olycka som du förknippar med ett ord.

### Aktivering



Aktiverings-skalan är den andra typen av känsla som finns med i denna undersökning. Den representeras av uppsättningen av figurer till höger. Den vänstra änden av denna skala representerar känslor av att vara stimulerad, uppspelt, alert eller upphetsad. Om du förknippar ett ord med fullständig aktivering indikerar du detta genom att kryssa i figuren längst till vänster. Den högra änden av skalan motsvarar den totalt motsatta känslan. Här kryssar du i om du förknippar ett ord med avslappning, lugn, avdomning, sömnhet eller avsaknad av upphetsning. Om du förknippar ett ord med fullständigt lugn indikerar du detta genom att kryssa i figuren längst till höger. Precis som med valens-skalan, kan du indikera medelhöga nivåer av aktivering genom att kryssa i någon av figurerna i mitten. Om du inte förknippar ett ord med varken upphetsning eller lugn kryssar du för figuren i mitten. Återigen, om du vill

göra en mer nyanserad skattning av vad du förknippar med ett ord, kryssa i någon av rutorna mellan två figurer.

När du har gjort två skattningar för varje ord kommer du att ha ett kryss i varje sektion, vilket alltså innebär två kryss per rad.

Vi är intresserade av din omedelbara reaktion, så gör dina skattningar i hög takt och tänk inte för länge på varje ord. Gör din skattning baserat på det första intryck du får när du läser ordet.

## Appendix B

Ord	Antal bokstäver	Bloggmix (frekvens per miljon)	Göteborgsposten 2012 (frekvens per miljon)	Valens	SD Valens	Arousal	SD Arousal
Armé	4	3	8,3	3,12	1,77	5,7	2,23
Aveny	6	0,3	1,6	5,84	1,13	3,37	1,813
Avrättning	10	1	1,4	1,43	0,86	7,51	1,735
Begravning	10	7,4	8	1,52	0,91	6,32	2,354
Blodig	6	7,7	21,9	2,86	1,51	6,14	1,96
Boxare	6	0,6	3,3	4,86	1,75	4,7	2,355
Brandman	8	3,7	10,6	6,5	1,36	4,95	2,4
Bröst	5	31,6	6	6,47	1,54	4,69	2,462
Bukett	6	4,6	1,7	7,36	1,18	4,66	2,107
Cancer	6	21,7	28,8	1,34	0,74	6,61	2,09
Casino	6	5,6	2,5	4,72	1,53	4,45	2,363
Chockad	7	18,1	20,8	3,76	1,63	6,25	2,01
Choklad	7	83,9	20	7,61	1,29	4,99	2,212
Dansare	7	3,9	16,5	7,17	1,33	5,61	2,398
Dator	5	255,1	78,4	6,14	1,46	4,3	2,134
Demon	5	5,3	6,2	3,87	1,58	5,06	2,361
Depression	10	13,2	13,1	1,66	0,96	5,55	2,476
Dum	3	97	31,4	2,86	1,22	4,73	1,919
Död	3	61	102,4	1,51	0,97	6,97	2,272
Ensamhet	8	12,5	9,3	2,52	1,63	5,11	2,626
Fiende	6	12,8	21,5	2,47	1,35	6,55	1,816
Flaska	6	24,6	12	5,03	0,74	3,19	2,086
Ful	3	86,9	20,5	2,98	1,46	4,85	2,136
Fåfänga	7	1	1	3,97	1,45	4,49	1,655
Fängelse	8	24,8	122,8	2,39	1,23	4,94	2,169
Författare	10	51	161,6	6,67	1,42	4,13	2,48
Förlamning	10	0,5	1,1	1,63	1,11	5,35	2,573
Förlorare	9	5,6	14,1	2,62	1,05	4,87	2,012
Gaffel	6	4,8	3,6	5,13	0,68	2,73	2,002
Gisslan	7	1,3	8,3	2,17	1,17	6,32	2,235
Glaciär	7	1,2	3,1	5,75	1,71	4,19	2,238
Gris	4	21,2	14	5,45	1,50	3,72	1,841
Groda	5	10	5,9	5,84	1,35	3,19	1,891
Gryning	7	2,4	8,4	7,13	1,50	4,02	2,306
Hammare	7	2,8	2,7	5,06	0,67	3,59	2,197
Hav	3	50	103,7	7,55	1,46	4,3	2,59
Helvete	7	54	18,4	2,61	1,59	5,74	2,532
Hotell	6	71,7	99,5	6,48	1,23	3,7	1,889
Huvudvärk	9	41,4	8,5	2,38	1,27	5,38	2,319
Idol	4	26,1	10,3	6,33	1,84	5,05	2,289
Industri	8	13,1	54,6	4,21	1,38	3,89	2,055
Infektion	9	6,9	10,5	2,43	1,18	5,37	1,882

Ord	Antal bokstäver	Bloggmix (frekvens per miljon)	Göteborgsposten 2012 (frekvens per miljon)	Valens	SD Valens	Arousal	SD Arousal
Inkräktare	10	0,7	1,5	2,45	1,32	6,83	1,902
Investera	9	13,3	32,3	5,62	1,60	4,65	1,802
Jordbävning	11	4,6	9,1	2,31	1,35	6,48	2,325
Kackerlacka	11	1,2	2,2	2,98	1,31	5,38	2,275
Kaos	4	26,3	30,3	3,2	1,77	6,61	2,126
Klippa	6	42,8	11,3	5,94	1,49	3,81	2,134
Klumpig	7	3,2	2,3	4,19	1,67	4,36	1,829
Konkurs	7	5,8	35,5	2,39	1,18	5,67	2,092
Kropp	5	255,9	133	6,21	1,54	4,68	2,306
Kvävas	6	1	0,1	1,33	0,74	7,76	1,775
Lastbil	7	8,3	50,3	4,73	1,16	3,58	1,978
Legend	6	6,6	6,6	6,95	1,29	4,83	2,114
Lejon	5	5,4	7,7	6,3	1,33	5,08	2,112
Ljuga	5	33,2	15,2	2,72	1,33	5,55	2,115
Löss	4	1,6	2,1	2,15	1,11	6	2,046
Massaker	8	2,9	22,9	1,37	0,74	7,63	1,782
Motorväg	8	5,5	21,1	4,7	1,54	4,52	2,07
Nyheter	7	107,7	114,1	5,91	1,43	5,27	1,828
Obscen	6	0,6	0,4	3,97	1,43	4,89	1,961
Odjur	5	2,7	1,7	3,67	1,44	5,24	2,113
President	9	27,3	229,1	5,13	1,24	4,03	1,976
Rakblad	7	1,2	0,3	3,94	1,59	4,78	2,387
Reptil	6	0,6	1,2	4,37	1,52	4,45	2,105
Rutten	6	5,1	3,1	2,77	1,14	4,05	2,051
Rykte	5	27,5	44,4	3,89	1,32	5,02	1,759
Sjukhus	7	48,3	172,6	3,95	1,97	5,5	2,055
Självisk	8	2,3	1,8	2,94	1,52	5,51	1,837
Själv mord	9	13,5	13,3	1,11	0,44	7,31	1,68
Skador	6	33,5	152,6	2,25	1,14	5,83	2,044
Skalle	6	22,6	12,3	4,88	0,84	3,69	1,885
Skepp	5	6,1	12,2	5,76	1,44	4,02	2,072
Skräp	5	12,8	20,4	3,3	1,35	4,18	1,968
Skyldig	7	16,9	42,6	2,74	1,23	6,02	1,741
Skyskrapa	9	2,4	3,5	5,55	1,65	4,43	2,148
Smuts	5	5,1	5,5	3,76	1,10	3,6	1,718
Smärta	6	38	32,1	2,05	1,07	6,94	1,883
Spis	4	15,2	9	5,48	1,05	3,38	2,136
Stad	4	479,7	550,4	6,18	1,48	5,05	2,242
Stank	5	1,8	1,3	2,39	1,26	5,13	2,289
Storm	5	22,1	37,3	4,62	1,85	5,77	1,804
Straff	6	23,9	69,3	2,86	1,81	6,02	1,996
Stöld	5	2,6	14,4	2,39	1,13	6,12	1,943



<b>Ord</b>	<b>Antal bokstäver</b>	<b>Bloggmix (frekvens per miljon)</b>	<b>Göteborgsposten 2012 (frekvens per miljon)</b>	<b>Valens</b>	<b>SD Valens</b>	<b>Arousal</b>	<b>SD Arousal</b>
Svartsjuka	10	3,1	2,8	2,39	1,31	6,8	1,931
Svält	5	3,7	3	1,54	1,08	6,02	2,393
Tandläkare	10	20,9	21,8	4,56	1,82	4,3	2,237
Tiggare	7	1,3	7,6	2,7	1,31	4,88	1,965
Tragedi	7	5,4	14,4	1,83	1,17	6,21	2,535
Träsk	5	2,4	2	4,28	1,18	3,35	1,927
Tävling	7	232,9	151	6,11	1,74	6,62	2,268
Upprörd	7	18,5	30,5	2,74	1,14	6,52	1,994
Vampyr	6	6,5	5,5	4,91	1,80	4,56	2,213
Vild	4	6,7	5	6,42	1,52	6,25	2,11
Vin	3	74,5	49,5	7,03	1,43	5,63	2,227
Våldsam	7	12	46,8	2	1,08	7,02	1,86
Äcklad	6	3	0,5	2,36	1,20	6,06	1,813
Ängslig	7	1,8	5,8	2,59	0,92	5,63	2,089
Överflöd	8	3,6	4,9	5,32	1,66	4,78	2,121

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