The Effect Of Social Power And Social Effectiveness On The Five Specific Input Parameter Groups

The effect of Social Power and Social effectiveness on the first input parameter group; the concern Involvement – concern Autonomy proportion

A child's preference for a specific upcoming play situation is a function of the pleasure the child expects to experience during this event. Let us set a child's preference, i.e. expected pleasure, to the upcoming play, to a value P.

Since the play situation allows for two categories of actions – Involvement (I) expressed in 'playing together' and Autonomy (A) expressed in 'playing alone' – the expected pleasure P is the sum of the expected pleasure (i.e., anticipatory or expected appraisal) of the I- and A-actions. Let e_I and e_A be the expected appraisals associated with I- and A-events respectively. Thus, the expected pleasure of the play situation P equals

$$P = f_I \,.\, e_I + f_A \,.\, e_A$$

for f_I and f_A the frequencies of the I- and A-actions during the play situation.

The proportion

$$f_I \,.\, e_I / f_A \,.\, e_A$$

represents the expected pleasure or appraisal of I-events over the expected appraisal of A-events and thus amounts to the relative preference of I-events over A-events, which is a basic parameter of the model (the Concern parameter, which is the I-over-A proportion). Given the two equations, the proportion $f_I \,.\, e_I / f_A \,.\, e_A$ depends on the constraint that $P = f_I \,.\, e_I + f_A \,.\, e_A$.

Given this constraint, let us first compare a play situation in which an average status child has *a play partner with higher social power, i.e. higher status (HP) with one in which the play partner has lower social power, i.e. lower status (LP*). Consistent with our experimental set up, the toys and overall situation are similar for all play situations. In this case, the preference for the situation involving a popular or high-status child is greater than that for a situation involving a rejected, or in general lower-status child. That is, $P_{HP} > P_{LP}$. The difference in preference is due to the difference in play partner. Hence, the proportion $f_I \,.\, e_I / f_A \,.\, e_A$ for the HP-case is greater than the corresponding proportion for the LP-case (which follows trivially from the fact that PH > PL). Put differently, *the I/A ratio parameter (the concern) increases as the social power (status, popularity) of the play partner increases* (all other things being equal).

Let us now compare a play situation in which the playing *child* has a *high social effectiveness* (HE) versus a situation in which the playing *child* has a *low social effectiveness* (LE), in a play situation with an average status play partner. It is assumed, without loss of generality, that the expected pleasure P is a constant, i.e. similar for both cases. A more socially effective child is defined as a child that is able to make his play partner respond more in accordance with the child's wishes or intentions. Thus, all other things being equal, for a more socially effective child the expected pleasure or appraisal of an involvement-event is greater than what a less socially effective child may expect under the same circumstances. Under this assumption, the proportion $f_I . e_I / f_A . e_A$ for the LE-case is greater than the corresponding proportion for the HE-case. The mathematical reason is that as e_I decreases with decreasing social effectiveness, the value of the function $f_I . e_I / f_A . e_A$ increases if $P = f_I . e_I + f_A . e_A$ is constant (as assumed) and $e_I > e_A$. The latter condition implies that given the kind of toys the children play with, playing together is on average more pleasurable than playing alone, which, we assume, applies to our experimental set up. Put differently, all other things being equal, *the ratio parameter I/A increases as the child's social effectiveness is lower.*

The calculations can be done as follows. Fix an initial value for e_I and for e_A, assuming that playing together is more pleasurable on average than playing alone. Let us set the values arbitrarily to 4 and 2 respectively. Second, fix a frequency for playing together, for instance 70% of the play time. The frequency for playing alone is 1 - 0.7 = 0.3 or 30%. Calculate the pleasure value that goes with these figures, which is P = 0.7*4+0.3*2 = 3.4. The concern proportion that goes with this pleasure value is 0.7*4/0.3*2 = 4.67 (rounded off). Next, take a lower value of e_I, for instance 3.5 instead of 4, which would correspond with the expected pleasure of an interaction attempt in a child of lower social effectiveness. Calculate the concern proportion required in order to realize the same total expected pleasure, 3.4, namely by solving $3.4 = f_I * 3.5 + f_A * 2$, knowing that $f_A = 1 - f_I$. The resulting value for f_I is 0.93 (rounded off) , and thus f_A = 1- 0.93 = 0.07 (rounded off). Hence, the value for the concern proportion is 0.93*3.5 / 0.07*2 = 24.5, i.e. the concern proportion is considerably higher than if e_I were higher (note that 24.5 is the exact value, which results if the figures are not rounded off, rounding off is done for convenience here). The calculation can be done for any value of e_I and e_A and for any frequency f_I and f_A, provided of course that the sum of frequencies is 1.

Since we have no information about the exact quantitative nature of the effect of the power- and effectiveness-variables, we make the simplifying assumption that they are on average about similar and add up linearly. We can simplify further by distinguishing three values (high, medium, low) for each variable.

Insert figure 4 about here

In the matrix in figure 4a, the results for the various types of dyads are represented. For instance, a rejected child with an average play partner falls in the cell corresponding with a social-power-of-play-partner equal to medium (effect size 2) and a social effectiveness equal to low (effect size 3). The resulting effect size (5) is equal to that of the average child with the popular play partner (see the matrix). Hence, their I/A ratios as set in the model will be similar and will be considerably bigger than the corresponding ratios for the average child with the rejected partner, or the popular child with the average partner, for that matter, whose effect size is 3.

In summary, the rejected child playing with an average play partner has an I/A ratio similar to that of an average child playing with a popular play partner. The ratio corresponds with effect size 5 and is described as "I *much stronger than* A" (see matrix above and Table 3 in the text. The average child playing with a rejected play partner has the same I/A ratio as the popular child playing with an average play partner. The ratio is described as "I a *little bit stronger* than A", corresponding with the effect size 3 in the matrix. Finally, the average child playing with an average play partner has an I/A ratio described as "I *stronger than* A", As stated earlier, the numerical values corresponding with these qualitative descriptions were estimated on the basis of best possible qualitative and quantitative fit criteria (see text).

The effect of Social Power and Social effectiveness on the other input parameter groups

The matrix in figure 4b represents the effects of social effectiveness (SE) and social power (SP) for the *second parameter group; the extent to which a particular behavior contributes to the realization of its associated concern (e.g. the extent to which a 'playing together' event realizes the child's I-concern).* In short, the effect is as follows: the more a child is socially effective, the easier it is for this child to accomplish a satisfactory interaction with the play partner. Thus, the contribution of a socially effective child's I -actions to the realization of his I-concern, will on average be greater than the contribution of a less socially effective child's I-actions to the realization of the less socially effective child's I-concern. In model terms, the higher the child's SE, the higher the value for this second parameter group. On the other hand, if the child's play partner has a high social status, playing with that high SP-child will be more preferable, fun, prestigious, etc. and the longer the child wants to stick with playing together with this play partner. That is, all other things being equal, with a high SP-partner, playing together gets less easily boring, shows less rapid habituation and so forth. This means that, on average, the higher the SP of the play partner, the *lower* the contribution of an I-event to the realization of the I-concern. Note that over all dyads the same distribution of effects can be seen as in the first input parameter group (see also table 3).

With the *third, 'effectiveness' parameter group*, we basically assume two conditions. The first condition is one in which the child finds both positive and negative expressions '*moderately easy*' to show, the second condition is one in which the child finds positive expressions '*moderately easy'* to show, and finds negative expressions '*difficult*' to show (see table 3). The rationale for the choice to only distinguish these two conditions is as follows. *First,* in this parameter group the probability of a positive or negative emotion is a non-linear function of the amount of appraisal. The probability is represented by an S-shaped function, the sigmoid function, determined by four free parameters [1]. In order to account for all influences of social effectiveness and power on these four parameters, a great number of relatively arbitrary decisions must be made. In an attempt to do so, it turned out that some parameter decisions counteracted others, thus leading to an overly complex parameter model that is in the end difficult to defend. *Second,* the problem is that the real amount of positive and negative expressions depends on the time course of the appraisals, i.e. the realization of the concerns. However, the above-mentioned sigmoid curves represent the chance of a positive or negative expression, *given a certain level of concern realization. Actual emotional expressions on the other hand depend on temporal and probably non-linear feedback and feedforward loops that the model would have to account for and that are likely to be highly complicated.*

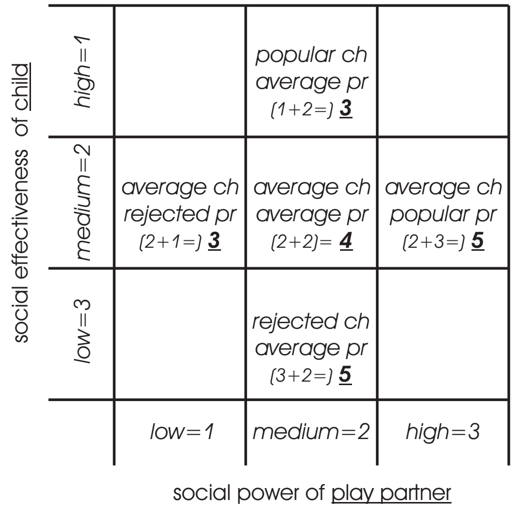
Instead of building all these considerations into the model, we opted for a minimal model of emotional expression and concern realization coupling, which makes no distinction between children and play partners with different social effectiveness and power. The hypothesis was that in addition to power-

[1] Parameter*a* governs the minimal value of the probability that an emotional expression will be shown and is in principle set to 0. Parameter *b* represents the maximal value of the probability curve. The value is always smaller than 1, since even with maximal concern realization one can still expect a fair amount of just neutral expressions. Parameter *c* specifies the value of concern realization for which the probability of showing the emotional expression is average (i.e. between the minimum and maximum probability). This is the point that corresponds with the middle of the sigmoid curve. Parameter *d* governs the slope of the sigmoid, both in terms of steepness and direction (e.g. decreasing with increasing concern realization, as with negative emotions).

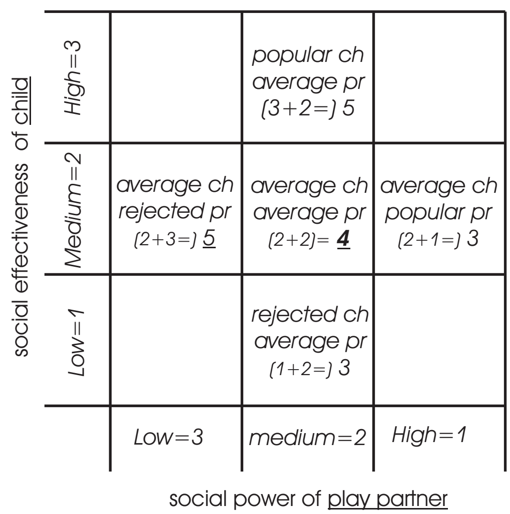
and effectiveness-specific concern parameter settings (see the preceding sections), this simple model would suffice to generate the emotional expression patterns that were expected on the basis of the empirical study. There is one exception, though, in that we assumed that there will be a stronger inhibition of negative emotional expressions as the social power of the play- or interaction partner is higher. The assumption is supported by the literature (Keltner, Gruenfeld, & Anderson, 2003)

In the *fourth parameter group, governing the effect of emotional expression on the preference for the accompanying concern, only one parameter is involved, comparable to parameter groups 1, 2 and 5*. However, since the effect of this parameter depends on the expression of emotions, we believe that the same problems hold as with parameter group 3, in which the expression of emotions is regulated. Hence, it was decided to give all children and play partners a similar parameter setting in this group, again with one exception. The exception concerns the role of the social power of the play partner: the higher the social power of the play partner, the stronger the effect of the play partner's emotional expressions on the child's preference of the accompanying behavior and its associated concern. That is, a positive (or negative) evaluation given by a person with higher social power has a stronger effect than an evaluation given by a person with lower social power.

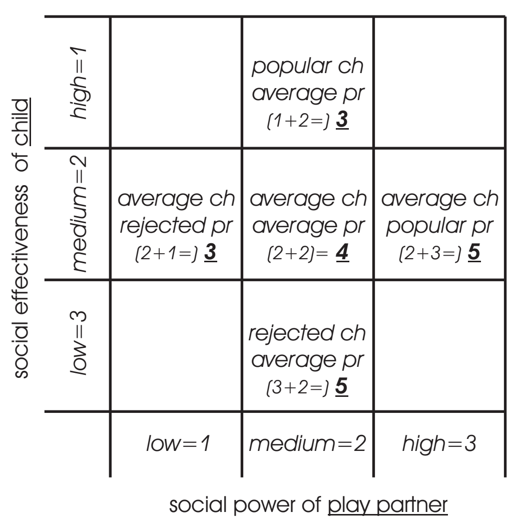
The matrix in figure 4c represents the effects of social effectiveness (SE) and social power (SP) on the *fifth parameter group, in particular the parameter regulating the contagiousness* of another person's behavior (see also table 3, bottom row). In short the effect is as follows: the lower the child's SE, the more the child is inclined to copy the behavior of his play partner, which, in model terms, means the higher the value of the corresponding parameter. On the other hand, the higher the play partner's social power, i.e. the higher the partner's social attractiveness, the more one is inclined to copy the play partner's behavior, i.e. the higher the contagiousness parameter of the play partner's actions. Note that – just as in parameter group 2 – these principles lead to a distribution of effect sizes across dyads and children that is similar to that of the first parameter group.



- a - *Concerns parameter group*



- b - *Realizability parameter group*



- c - *Non-intentional behavior group*