CHAPTER 10
LONGITUDINAL ANALYSIS: TESTING THE MODEL

10.1 Introduction

Part of the children under investigation (30 of each group) were followed for
three years. In each of these years we collected test-scores, expectations of
success and attributions for task I, II and III and teachers ratings.

On these data we performed longitudinal analyses. Our goals were firstly to
find confirmation for our model, and secondly to assess differences in develop-
ment between handicapped and non-handicapped children. In this chapter we
discuss the findings concerning the confirmation of our model; the developmental
differences will be the subject of chapter 11. Our analysis of the model consists
of three steps.

Firstly, we will statistically analyse the variables which have been used in the
analysis of the model. In these analyses we used combined scores for competence
motivation and realistic use-of-information. We tested the internal consistency
of these scores, the stability of the variables over time and the relation between
our data and teachers ratings of the same variables (section 10.2).

Secondly, we will analyse the relations between the variables in the non-handi-
capped children. We expect that some of the relations between the variables may
differ between handicapped and non-handicapped children. In the handicapped
group, the analysis of these relations may give additional problems. If we do not
find any confirmation of the model in non-handicapped children, analyses of the
data of the handicapped children would be useless (section 10.3).

If we find confirmation for our model in the non-handicapped group, our third
step will consist of the analysis of the model with regard to the handicapped
group (section 10.4).

10.2 Analysis of the variables

10.2.1 Introduction

We have used various methods for assessing competence-motivation and use-of-
information. For our longitudinal analyses, we combined these different scores
to one total score for each variable by computing z-scores of the separate scores
and adding them. Although the different scores represent different aspects of
competence-motivation respectively use-of-information, we assume that their sum
can be considered to be a global overall indication of the concept. In order to
obtain an evidence of the homogeneity of the variables, we investigated whether
the different operationalisations assess the same underlying concept.
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global overall indication of the concept. In order to obtain an evidence
of the homogeneity of the variables, we investigated whether the different
operationalisations assess the same underlying concept.
A reliable interpretation of our longitudinal data requires information
concerning the stability of the variables in time. The circular relations
described in our model suggest that competence-motivation and perceived
competence should show consistency over time because of the self-con-
firming processes which we expect to occur.
In addition, we investigated to what extent our operationalisation of the
variables is congruent with the perception of the teachers. Although
teachers ratings as such may be considered too unreliable to be a good
indication of the validity of our operationalisation, for practical applica-
tions it is important to know whether the variables which we investigate
correspond with the teacher’s perception.
To obtain an indication whether our findings correspond with the
teachers ratings of ‘motivation’, ‘perceived competence’, ‘adequate use of
information’ and ‘perceived control’, we computed correlations between
the teachers ratings and our empirical data. The teachers rated the
children’s perceived competence, motivation for challenging and independ-
ent work, intrinsic motivation, persistence, capacity to determine causes
of outcomes and to estimate their competence and perceived control over
failure on a five-point scale.

10.2.2 Method
We have used various methods for assessing competence-motivation and
use-of-information. For our longitudinal analyses, we combined these
different scores to one total score for each variable by computing
z-scores of the separate scores and adding them. Although the different
scores represent different aspects of competence-motivation respectively
use-of information, we assume that their sum can be considered to be a
global overall indication of the concept. We compute z-scores to elimi-
nate artificial differences in mean and standard deviations.
The total scores are composed by the following elements:
Motivation: three test-scales. In the third year ‘reason for choice’ and
‘persistence’ were added. The internal consistency in the third year for
non-handicapped children is 0.60, for handicapped children 0.62.
Adequate use of information: ‘discrepancy between the teachers ratings
and the child’s scores’, ‘non-logical adjustment of expectations’ and in
the third year also 'logical use of information in stories', 'congruence between choice and reason for choice', 'realistic attribution for task with unambiguous cause'. The internal consistency for non-handicapped children is 0.59, for the handicapped 0.40.

For perceived competence the scale 'perceived cognitive competence' was employed and for actual frequency of success the teachers ratings of school-competence. For perceived control, we used the direct assessment scores collected in the third year: the frequency of perceived possibilities to change negative outcomes, because we found the attribution-scores to be not reliable. This implies that we have no perceived control measures for the first and second year.

We performed several statistical analyses on these scores: the stability over three years and the correlations of the combined scores with an external measure. We estimated the stability scores by treating the scores of the three different years as subscales of a test, and then computing the internal reliability of this test. For this external measure we collected teachers ratings of motivation, adequate use of information, perceived control and perceived competence. We performed these analyses in order to have an indication of the psychometric quality of the instruments used. To obtain an indication whether our findings correspond with the teachers ratings of 'motivation', 'perceived competence', 'adequate use of information' and 'perceived control', we computed correlations between the teachers ratings and our empirical data. The teachers rated the children's perceived competence, motivation for challenging and independent work, intrinsic motivation, persistence, capacity to determine causes of outcomes and to estimate their competence and perceived control over failure on a five-point scale.

10.2.3 Results
Firstly, we present the result of some statistical analyses of the variables used. In table 10.1 the stability of the scores over three years is presented.
Table 10.1 Stability over three years

| Scale 'Motivation for challenging work' | H n=29 | NH n=30 |
| Scale 'Intrinsic motivation' | .62 | .86 |
| Scale 'Motivation for independent work' | .58 | .78 |
| Choice of challenging tasks | .65 | .58 |
| Scale 'Perceived cognitive competence' | .03 | .31 |
| Scale 'Physical perceived competence' | .65 | .71 |
| Mean success expectation preceding success | .63 | .53 |
| Discrepancy teacher ratings-child’s scores | .72 | .51 |
| | .34 | .24 |

The stability is rather high, except for the variables 'Choice of challenging tasks' and the 'discrepancy-scores' (the discrepancy between the teachers and the child ratings of the children's competence).

Table 10.2 shows the correlations of our empirical data with teachers ratings of the same variables.

Table 10.2 Correlations between teachers rating and empirical data of the same variable

| | H n=29 | NH n=30 |
| Motivation | .17 n.s. | .53 p <.01 |
| Perceived competence | .01 n.s. | .16 n.s. |
| Adequate use of information | .25 n.s. | .30 p <.10 |
| Perceived control | .34 p <.05 | .19 n.s. |

Most correlations between our data and the teachers ratings are very weak and mostly non-significant. We did however find high correlations between the teachers ratings and actual frequency of success:
Table 10.3 Correlations between teachers rating of frequency of success and the empirical data

<table>
<thead>
<tr>
<th></th>
<th>H n=29</th>
<th>NH n=30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>.59 p &lt;.01</td>
<td>.71 p &lt;.01</td>
</tr>
<tr>
<td>Perceived competence</td>
<td>.50 p &lt;.01</td>
<td>.60 p &lt;.01</td>
</tr>
<tr>
<td>Adequate use of information</td>
<td>.50 p &lt;.01</td>
<td>.60 p &lt;.01</td>
</tr>
<tr>
<td>Perceived control</td>
<td>.33 p &lt;.05</td>
<td>.47 p &lt;.01</td>
</tr>
</tbody>
</table>

If we consider the teachers ratings as one scale, the inter-item reliability is .83 for the non-handicapped group and .79 for the handicapped children.

10.2.4 Discussion
The stability in time of the variables is rather high. Only the stability of 'Discrepancy scores' and the 'Choice of task level' is below .50. The low stability of the task-selection scores may be explained by the problems children have in selecting a really challenging task. This may introduce a lot of random variation. The stability of the discrepancy-scores may be decreased by systematic differences between teachers. Almost all children had at least two different teachers in the three test-years. In general, competence-motivation, perceived competence and adequate use of information appear to be rather stable in children between 7 and 12 years. The correlation between these scores and the teachers ratings is rather weak; all correlations, except for motivation, are below .50. All teachers ratings correlated highly with frequency of success however. This actual frequency of success is operationalised as the teachers rating of the competence of the children. The internal consistency of the teachers ratings is very high. This suggests that teachers may develop a rather homogeneous picture of a child, either negative or positive. This is consistent with other research-findings. Van den Bercken et al. (1982) found that teachers ratings of motivational aspects of behaviour were not related to the observed motivational behaviour, but were internally consistent. The only external variable to which the teachers ratings were related was the rate of desired/undesired behaviour.

10.3 Testing the model in non-handicapped children
10.3.1 Introduction

In this section we present our findings concerning the model in non-handicapped children. Theoretically can be assumed that the model is useful for handicapped as well as non-handicapped children. The values of the variables will differ between both groups, but the underlying relations are assumed to be the same. However, if we can not confirm the model in non-handicapped children, it would be useless to apply it in the handicapped group.

Testing the complete model is not possible because we have no data of all components. Moreover, the group of children that completed all three assessment-years is rather small, and the age-range is more than three years. Path-analyses and other highly sophisticated methods for analysis are not applicable because our data do not meet the required assumptions. We decided to formulate specific expectations, and confined our analyses to correlations and regression analyses. We performed these analyses on the data of the second and the third year only, because for these years more data concerning information-processing (second and third year) and perceived control (third year) were collected.

Based upon our model, discussed in chapter 4, we can formulate expectations with regard to the relations between competence-motivation, perceived competence, perceived control and the frequency of success-experience. We did not assess the frequency of success-experience, but we actually do have an indication of the frequency of success in the classroom, namely the 'teachers-rating of schoolcompetence'.

Expectation I. Because the influence of frequency of success upon competence-motivation runs via perceived competence and perceived control, we expect that frequency of success is a good predictor for competence-motivation if it is entered first in a regression equation. We expect that it will not contribute to the explained variance if perceived control and perceived competence are entered first. Not only the actual frequency of success, but also information from others contributes to perceived competence and perceived control. These variables will still contribute to the explained variance in competence motivation if frequency of success was entered first.

Expectation II. The motivation will influence performance (frequency of success) rather directly. Higher effort and persistence will pay off soon. In future years the motivation will influence perceived competence and perceived control via frequency of success. Again, we expect that the eventual correlation between motivation in the previous year and actual
perceived competence will disappear if frequency of success is entered in the equation first.

Expectation III. The frequency of success influences both perceived control and perceived competence, and via these motivation. The influence of the frequency of success will be delayed, because perceived competence and control are relatively stable characteristics, based upon a large amount of experience. Hereafter changes in conditions (like increased frequency of success) will influence these concepts not immediately, but only if they are consistent and long-lasting. We expect that the frequency of success of preceding years shows a higher correlation with current perceived competence and perceived control than actual frequency of success.

Expectation IV. A complicating factor is the quality of information-processing. If this is low, a lot of randomness will be introduced. It may result in a superficial and non-realistic perceived competence, which is not related to the child’s frequency of success and competence-motivation. We do not expect strong correlations between adequate use of information and perceived competence, because non-adequate use of information may result either in too low or in too high perceived competence. In general however, a low capacity to use information can be expected to decrease actual control and success, because the child does not use the information in an appropriate way in order to learn from success and failure. There will be a time delay: increasing adequacy of the use of information will only after some time increase the frequency of success, because it takes some time to gather and integrate the success- and failure-experiences. Consequently, we expect that adequate use of information will not be related to the level of perceived competence but will be related to the future frequency of success.

Expectation V. In general positive correlations are expected between competence-motivation, perceived competence, perceived control and frequency of success of both years.

The expectations are not considered sharp experimental tests of our model. If all expectations turn out to be right, we still would not be allowed to conclude that the model is correct. However, confirmation of an expectation does actually contribute to the plausibility of the model. The more expectations are confirmed, the more plausible our model will be. Thus we conceive of the expectations as plausibility arguments, and not as strict decisive findings.
10.3.2 Method
Expectations I and II were tested by regression-analyses as described above. Expectation III was tested by computing correlations between frequency of success of the second and third year, and perceived competence and perceived control (third year). Expectation IV was tested by computing correlations between competence-motivation, perceived competence, frequency of success (second and third year scores) and perceived control (third year only).

10.3.3 Results
Expectation I holds that the influence of perceived competence and perceived control upon motivation remains after entering frequency of success. The influence of frequency of success is nil if perceived competence and perceived control are entered first.
Expectation II holds that motivation predicts future perceived competence only via frequency of success; if frequency of success is entered first, there is no significant influence of motivation left.

Table 10.4 Regression analysis for the prediction of motivation and perceived competence

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Predictors</th>
<th>Adj R²</th>
<th>Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>motivation</td>
<td>perceived competence +</td>
<td>.37</td>
<td>3.0</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>motivation</td>
<td>perceived control -</td>
<td>.02</td>
<td>3.7</td>
<td>n.s.</td>
</tr>
<tr>
<td>motivation</td>
<td>frequency of success +</td>
<td>.27</td>
<td>3.2</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>step 1 perceived competence</td>
<td>.44</td>
<td>2.8</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>step 2 frequency of success</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>step 1 perceived competence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>step 2 perceived control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>step 3 frequency of success</td>
<td>.42</td>
<td>2.9</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>motivation 2 +</td>
<td>.12</td>
<td>1.0</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>frequency of success 2</td>
<td>.17</td>
<td>0.9</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>step 1 frequency of success 2</td>
<td>.16</td>
<td>0.9</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>step 2 motivation 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A '2' after the variable name means 'score of the second year'. Otherwise the score is that of the third year (non-handicapped, n=30)
With regard to motivation, perceived competence predicts more variance than frequency of success. Entering frequency of success following perceived competence increases the explained variance only very slightly. This confirms expectation I. Contrary to our expectation however, perceived control explains no variance. Including it in the combined analysis even reduces the amount of explained variance.

Perceived competence is predicted best by actual frequency of success only. Although also competence-motivation is a significant predictor on its own, entering motivation after frequency of success reduces the explained variance. This confirms expectation II.

By computing correlations, we tested expectations III, IV and V. Frequency of success in preceding years shows a higher correlation with perceived competence and perceived control than actual frequency of success (expectation III). Adequate use of information will not be related to perceived competence and control, but will be related to future frequency of success (expectation IV). Finally, the correlations between competence-motivation, frequency of success, perceived competence and perceived control will be positive (expectation V). The correlations are presented in table 10.5.

Table 10.5 Correlations between the variables for non-handicapped children

<table>
<thead>
<tr>
<th>n=30 3rd year-</th>
<th>motivation</th>
<th>perc.comp.</th>
<th>perc.contr.</th>
<th>competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>second year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>motivation</td>
<td>.50 p&lt;.01</td>
<td>.40 p&lt;.05</td>
<td>-.11 n.s.</td>
<td>.21 n.s.</td>
</tr>
<tr>
<td>perc.comp.</td>
<td>.36 p&lt;.05</td>
<td>.40 p&lt;.05</td>
<td>-.24 n.s.</td>
<td>.21 n.s.</td>
</tr>
<tr>
<td>competence</td>
<td>.55 p&lt;.01</td>
<td>.45 p&lt;.01</td>
<td>-.12 n.s.</td>
<td>.76 p&lt;.01</td>
</tr>
<tr>
<td>real. use of info.</td>
<td>.04 n.s.</td>
<td>-.16 n.s.</td>
<td>.09 n.s.</td>
<td>.35 p&lt;.05</td>
</tr>
<tr>
<td>third year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>perc.comp.</td>
<td>.63 p&lt;.05</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>perc.control</td>
<td>-.23 n.s.</td>
<td>-.37 p&lt;.05</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>competence</td>
<td>.47 p&lt;.01</td>
<td>.08 n.s.</td>
<td>-.16 n.s.</td>
<td>---</td>
</tr>
<tr>
<td>real. use of info.</td>
<td>.13 n.s.</td>
<td>-.19 n.s.</td>
<td>.02 n.s.</td>
<td>.17 n.s.</td>
</tr>
</tbody>
</table>
Frequency of success of the preceding year is related to perceived competence in the third year. This relation does not hold for actual success-frequency. This confirms expectation III.

The only significant correlation of adequate use of information is with the frequency of success in the following year. This confirms expectation IV.

The most unexpected result is again the consequently negative correlation of perceived control with the other variables. With regard to perceived control our expectation V cannot be confirmed.

10.3.4 Discussion
Expectations I to V are confirmed with regard to perceived competence only; the influence of frequency of success upon competence-motivation is indirect, via perceived competence; competence-motivation influences perceived competence via frequency of success; there is a time delay in the influence of frequency of success upon perceived competence; and adequate use of information only influences the actual frequency of success.

For perceived control, none of the expectations can be confirmed. With regard to expectation V, the relationship of perceived control with the other variables is unexpected, however. There is a consistent non-significant negative correlation between perceived control, and perceived competence and competence-motivation. In interpreting the results we must take into account that in general perceived control is high. An average of 76% of the story-failures was perceived as improvable. Only 5 children perceived half or more of the performances as non-controllable and 11 perceived all outcomes as improvable. Low perceived control does not mean that the children perceive most performances as non-controllable. These high scores suggest that a ceiling effect may have reduced the variance in our data, which may explain that we did not find significant correlations. However, a ceiling effect does not explain why the weak correlations which we observed, are consistently negative. An explanation for this may be found in the influence of information and feedback from the teachers. If teachers perceive a child as sufficiently competent but unwilling or unmotivated, they may stimulate the child, stress the importance of effort and training, and probably give the children homework and concrete instructions about how the achievements can be improved. Those children who are indeed sufficiently competent
experience that spending more time and effort results in higher performance. They perceive a high co-variation between effort and outcomes. Another category of children, lowly motivated and with low competence, may repeatedly hear that effort and training may improve achievements, but they do not experience this in practice. These children may simply produce answers which are reproductions of the attributions they always hear from adults.

Highly motivated children in general show positive task behaviour. They practice and spend effort. They fail only when effort and practising are no sufficient remedy against failure. Teachers will not emphasise effort and practice as strongly as remedy against failure as they would do in moderately to lowly motivated children. These children have already tried the solutions that the lowly motivated children point out as ways to increase their performance, and fail only if these solutions turn out to be non-adequate. They experience less co-variation between effort and outcomes, because their effort does not vary much. So they perceive their failure as less controllable. They fail less often, given the same competence, but if they fail, they have less methods left to exercise control. Another possible explanation is that children with high fear of failure may reduce their effort in order to protect their self-esteem. Children who spend little effort may, quite realistically, perceive bad performance as improvable by effort, and thus as controllable. Jagacinski and Nicholls (1990) assume this is probably an unconscious strategy, which may be mediated by withdrawing of commitment.

These explanations obtain some confirmation from discussions with a few children after the test. One competent and highly motivated boy repeatedly perceived the failures in the story as non-improvable. He appeared and was rated by his teacher as feeling highly responsible for his own achievements. We asked him whether he thought that the story subject could improve his outcomes by spending more effort and by training. He answered, "I suppose he has already tried that, but that it did not work".

A twelve-year-old girl who had very low scores on all motivation variables and a high perceived control said about school "Well, I have to go to school but I do not like it at all....... When I perform very badly I have to make homework, and I really hate that". Asked whether the homework improved her results she admitted. "Sure it does, but I hate spending my free time at schoolwork". This girl sees her achievements as controllable, she describes exactly what she has to do to improve her
performance, but she does not wish to invest the time needed for this control. The teacher of this girl told that she was very lowly motivated in all classroom activities, and that she actually had the competence to perform well if she would spend enough time on her work. He had tried to stimulate her by suggesting effective strategies to improve her work, giving her homework with instructions, etcetera.

The explanations mentioned above explain especially why a negative relationship can exist between motivation and perceived control in failure situations. Parents and teachers of lowly motivated children may be primarily focused upon the low performance, stressing the controllability and thus responsibility for failure, and pay less attention to success. Trudewind (1975) found that a specific maternal attribution pattern (in which the child’s failure is attributed to lack of aptitude, and success not to aptitude) predicted later fear of failure in schoolboys. These children are held responsible for failure, but not for success. Feeling responsible for failure but not for success is not a motivating condition. Moreover, it threatens one’s self-esteem, and a good way to protect self-esteem in such a situation is by not trying. In addition, children from age eleven or twelve on understand that there is an inverse relationship between effort and competence as causes of good performance: if one is more competent, one requires less effort to achieve a particular success. For them, stressing the importance of spending effort to perform well, may confirm their low perceived competence.

We assessed only perceived control for failure. If the explanation above is correct, one should expect that lowly motivated children have high perceived control especially for failure. For highly motivated children, it is expected that they perceive failure as non-controllable more often, but more frequently perceive success as a controllable result of their own actions. Indeed we found a positive relationship between controllable attributions for success and motivation ($r=.31$, $p<.05$). However, attributions following failure that are classified as controllable appeared to be no reliable indications of perceived controllability of the outcome. We have no such information about attributions following success, because all stories concerned failure situations. More research is needed to test this particular assumption.

If these explanations hold, it may be expected that children with low motivation have more experience and knowledge of concrete ways of practising and improving low performance. We tested this expectancy and found a non-significant negative correlation between the knowledge of
concrete ways to improve performance and motivation ($r=-.14$). Although we obtained some practical evidence for our explanation, more empirical evidence is needed.

The consequences of low and high motivation for teacher’s behaviour and success-frequency are schematically presented in figure 10.1.

<table>
<thead>
<tr>
<th>Teacher’s behaviour</th>
<th>Motivation</th>
<th>Effort</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>generally content; global praise</td>
<td>high</td>
<td>generally high</td>
<td>mostly success, some failure</td>
</tr>
<tr>
<td>not content; stressing importance of spending effort and practice</td>
<td>low</td>
<td>sometimes high, f.i. external motivation</td>
<td>few success, mostly failure</td>
</tr>
</tbody>
</table>

![Figure 10.1 Relations between motivation, teacher’s reactions and outcomes](image)

In summary, we may conclude that our assessment-method validly measures perceived control of the children for their own actual school-failures, but probably not their perceived control for success and their perceived control in new tasks and skills. Although we still assume that in general high perceived control will positively influence competence-motivation, low competence-motivation may influence the environmental information, which results in an increase in perceived control.

The results raise still another question. We assume that a low motivation is caused by low perceived control and low perceived competence. If low motivation is inversely related to perceived control, what then causes low motivation? The relation between perceived competence and motivation is positive: lowly motivated children perceive themselves as not compet-
ent in their school-work. Low perceived competence might be one of the causes of a low motivation. The perceived control of these children suggests however that they know ways to improve their schoolwork. They just do not apply this knowledge.

If the high perceived control of some lowly motivated children is indeed the result of the teacher’s feedback, it is likely that their perceived control was low in the past. In the past these children may have had the experience either that they could not influence their performance, or that failure has strong negative consequences. They developed a low perceived competence, a low perceived control and a low competence-motivation. For children who experience few mastery-successes in school, it is a reasonable strategy for protecting one’s self-esteem to decrease the value of school-performance, and turning one’s interest to more success-providing activities, or to loose interest in experiencing mastery. These children probably withdrew their commitment with school-achievements. Deci and Ryan (1985) state that interest in specific competence fields are influenced by past experience of success and mastery in that field. This withdrawal resulted in less effort and worse performance. Their teacher probably tried to influence this by emphasising the role of effort to improve insufficient performance. This might have improved perceived control especially for failure. If the teachers do not emphasise perceived control and feelings of personal responsibility for success to the same extent, it may not result in higher perceived competence. Research into volition-processes suggests that the choice of activities is preceded by an analysis of the costs, risks and benefits of all potential activities (Gollwitzer, 1989). If the commitment is low, the risks may not be especially high, but the benefit may be so low, that the child decides not to spend the required effort. For children who have high perceived control for failure only, the risks of spending effort are high because they feel responsible for failure, and the benefits are low because they feel less responsible for success. The child may decide not to spend costs and run high risks for low potential benefits. In addition, values in the culture and socialisation influence the children’s interest and commitments (Vedder, 1987).

In summary: besides to being affected by perceived competence and perceived control, the motivation for exercising control in a particular field of competence depends on the child’s interest and commitment in this field. This interest is probably influenced by previous experience and by values and feedback of the home-environment. Whether perceived
competence, perceived control and values actually have a positive influence upon competence-motivation, depends on the value of all these three variables.

The topics discussed above have implications for our model. Firstly, we assume that there is a direct relationship between task-behaviour and information from the environment. Secondly, a high motivation is not dependent purely upon perceived competence and perceived control, but also upon individual differences in interest and in the valuation of the activity and/or its outcome. In the scheme this variable is labelled 'values'. Values include both the value of the field and task and formal aspects of the activity, for instance level of challenge. Most people prefer activities with an intermediate level of challenge (Heckhausen et al., 1985; Atkinson, 1966).

A revised model, in which these relations are included, is presented in figure 10.2 How exactly children’s behaviour influences the teacher’s feedback, and what sort of relationship exists between values or commitments and previous experience in mastery, and how these values influence motivation should be explored in more detail.
Constitutional/neurological factors | Information concerning one’s competence (outcomes and reactions from others)

Rules of processing

Perceived competence & Perceived control | Values

Attributions

Motivation

Task behaviour

Outcomes

Figure 10.2 The revised model

10.4 Testing the model in handicapped children

10.4.1 Introduction

The relations between the variables in the model are expected to differ between both groups in several ways. Firstly, the handicapped children were found to have more problems in adequately processing information concerning their own achievements and task characteristics. As discussed in chapter 10, a low capacity to use this information might influence the relationships between the variables in a non-systematic way. This is expected to result in weaker relationships in the group of handicapped children. Secondly, the differences in adequate use of information are higher between handicapped children: for example, the standard deviation for discrepancy-scores and nonrealistic adjustment of expectancies is respectively 4.1 and 1.0 in the handicapped children, compared to 2.2 and
0.4 in non-handicapped children. This may result in a stronger relationship between adequate use of information and actual capacities and success in the handicapped group.

Thirdly, we assumed that in non-handicapped children, social reactions upon task-behaviour may cause specific differences between lowly and highly motivated children. These differences may not occur in handicapped children. If handicapped children frequently fail, teachers and parents may tend to attribute failure of the child to the limited capacities of the child, instead of to lack of effort. This does not result in stressing effort as a way to improve performance, but probably in help, giving easier tasks or pity. Serra (1990) found that in six- to seven-year-old handicapped children often extensive help is given in schoolwork; in preschool-children once in every three minutes. Helping instead of stimulating the child to spend more effort might result in lower perceived control for children who frequently fail, regardless of the cause of failure. In handicapped children it is probably difficult to determine whether failure is caused by low effort or by the handicap. Therefore we expect that in handicapped children low motivation which results in low achievement is not followed by perceived control-enhancing environmental reactions, but instead by reactions that may still further decrease perceived control. This results in a positive relationship between motivation and perceived control in handicapped children.

In summary, we expect that in handicapped children:
I. The relationships between the variables will be weaker than in non-handicapped children.
II. Adequate use of information influences competence more strongly than with non-handicapped children.
III. The relationship between motivation and perceived control will be positive.

10.4.2 Method
We used the same methods of analysis as in the non-handicapped group: we performed regression-analysis on the same variables, and computed correlations between the different variables of the second and third year. As discussed in chapter 10, these methods are limited, and again we will consider confirmation of our expectancies not as a complete confirmation of our model and assumptions, but merely as increasing the plausibility of their validity.
10.4.3 Results
Regression analyses showed that neither perceived competence, nor perceived control, nor competence are significant predictors for motivation. This confirms expectation I that the relationships between the variables are weaker in handicapped children. In fact, we did not find any relations at all. Due to this lack of relationship, we can not confirm expectation III, that perceived control will positively influence the competence-motivation.
In the correlation-matrix (table 10.6) it can be seen however that the relationship of perceived control with the other variables is weak, but generally positive.
There is a strong positive relationship between adequate use of information in the second year, and frequency of success in the third year. In general, the relationships between the different variables are less strong than in non-handicapped children (see table 10.5). These results confirm our expectations I and II.

Table 10.6 Correlations between the variables for handicapped children

<table>
<thead>
<tr>
<th>n=29 3rd year-&gt;</th>
<th>motivation</th>
<th>perc.comp.</th>
<th>perc.contr.</th>
<th>competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>second year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>motivation</td>
<td>.49 p&lt;.01</td>
<td>.37 p&lt;.05</td>
<td>.35 p&lt;.05</td>
<td>.16 n.s.</td>
</tr>
<tr>
<td>perc.comp.</td>
<td>.05 n.s.</td>
<td>.56 p&lt;.05</td>
<td>-.16 n.s.</td>
<td>.14 n.s.</td>
</tr>
<tr>
<td>competence</td>
<td>.33 p&lt;.10</td>
<td>.37 p&lt;.10</td>
<td>.25 n.s.</td>
<td>.52 p&lt;.01</td>
</tr>
<tr>
<td>real. use of info.</td>
<td>.23 p&lt;.10</td>
<td>.20 n.s.</td>
<td>.20 n.s.</td>
<td>.58 p&lt;.01</td>
</tr>
<tr>
<td>third year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>perc.comp.</td>
<td>-.32 p&lt;.05</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>perc.control</td>
<td>.15 n.s.</td>
<td>.05 n.s.</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>competence</td>
<td>.23 n.s.</td>
<td>.15 n.s.</td>
<td>.19 n.s.</td>
<td>---</td>
</tr>
<tr>
<td>real. use of info.</td>
<td>.09 n.s.</td>
<td>.16 n.s.</td>
<td>.29 p&lt;.10</td>
<td>.26 n.s.</td>
</tr>
</tbody>
</table>

10.4.4 Discussion
Our regression-analyses indicated that neither perceived competence, nor competence, nor perceived control predicted competence-motivation. For perceived competence, neither competence nor motivation predicted any variance. In addition, correlations between the variables are less strong
than in non-handicapped children. These findings support expectation I that the relationships between the variables are weaker in the handicapped group. The high relationship between adequate use of information in year two and competence confirms our expectation that the adequate use of information plays an important part in the general functioning of handicapped children. The handicapped children who in the preceding year could not determine adequately what may have caused their performance or estimate their chance of success at tasks, are less competent and have a somewhat lower motivation, perceived competence and perceived control, although the last two relations are weak and do not reach significance.

The relationship between perceived control and the other variables is in general non-significantly positive. This lends some support for expectation III that perceived control is positively related to the other variables in handicapped children. The reactions of the environment to failure in handicapped children are probably not perceived as control-enhancing, as is the case with non-handicapped children.

We thus find that the variables under investigation are not as strongly related as expected, probably due to less adequate use of information in handicapped children. What does this mean for our results and for the validity of our findings?

With regard to competence-motivation it does not decrease the validity of our findings. Independent of adequacy of information processing, observed persistence, preference for challenging and independent work and interest in schoolwork are expected to be important indications of a positive attitude towards schoolwork and to have positive implications for functioning in school. The rather high stability in time suggests that lower information processing capacity does not result in a highly fluctuating and therefore less reliable competence-motivation. With regard to perceived control over bad performance, formulating concrete and realistic action plans probably gives a more reliable indication of perceived control than a mere ‘yes-or-no’ answer on the question whether the performance can be improved. However, the children’s ideas concerning the possibilities to improve failure in school are important. The idea that nothing can be done to improve bad performance probably influences their attitudes and behaviour in the face of failure. With regard to perceived competence our results suggest that perceived competence that is measured by paper and pencil tests may not be a reliable operationalisation for many handicapped children. It can be questioned whether
their answers to the items have any relationship with their actual experience and behaviour in the class. It is possible that for children with severe problems in information-processing, an abstract and global concept of their own competence has not much relevance, similar to children under six years of age. It should be kept in mind that there is a high variation in capacity to use information in the handicapped group. Only part of this group has problems in information processing. For these children, we should focus upon the results of the most concrete behavioural measures. Actually observed persistence, actually observed behaviour while facing difficult tasks and preference for very easy tasks might give a more reliable indication of perceived competence than paper and pencil tests.

In the handicapped group we found weak relationships between competence and the other variables. This may be due partly to our choice of ‘teachers ratings of competence’ as operationalisation of ‘frequency of success-experiences’. The teachers rating of scholastic competence may have a weaker relationship to experience with successful mastery than in non-handicapped children. Firstly, in individual schoolsettings, also the least competent children can experience frequent success. Secondly, the frequency of early success-experiences in handicapped children is more dependent upon their physical capacities and upon the adjustment and attitude of the home-environment, than upon their relative cognitive competence. The weak relations with competence do probably not reflect an inadequate use of competence information by the children, but an inadequate operationalisation of ‘frequency of success-experiences’.

Another question arising from our results concerns the applicability of the model in handicapped children. Although we did find the expected differences in the relations as compared to non-handicapped children, our results also indicate that neither perceived control, nor perceived competence predict competence-motivation in handicapped children. In addition, success frequency does not predict perceived competence and perceived control. We assumed that this may be caused partly by our operationalisations, which were probably inadequate for handicapped children. However, we did not find a significant relation between perceived control and competence motivation either. This may be due partly to the fact that we assessed perceived control for failure only. Additional analyses (Kunnen, in press) suggest that in handicapped children perceived control may be a necessary prerequisite for motivation for independent work and persistence, but not for motivation for challenging work and intrinsic
motivation. In section 11.4 we will discuss the claim in that especially "challenging work" may have a different meaning in handicapped special school-pupils as compared to non-handicapped children. Nevertheless, we may conclude that our results are not sufficient to confirm the applicability of the model in handicapped children. On the other hand, they also do not present strong counter-evidence. Theoretically, our general assumption that frequent success-experience results in a positive perceived competence and control and via these in a positive competence-motivation, has not been disconfirmed. In handicapped children however, the problems in information processing, the possibility that our operationalisations do not always assess the same concept as in non-handicapped children, and the large individual differences between the handicapped children may prevent us from finding significant relations between the different variables. Probably another research method is required for testing the model in these children. In section 12.3 we shall discuss such an alternative investigation method.