

# Structural equation modeling of the psychotherapy change process : stages of the construction of the model and preliminary results

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**BACKGROUND AND OBJECTIVES :** Since 2000, the evaluation of psychotherapy has associated to the outcomes research, a new line of research on understanding the mechanisms of therapeutic efficacy in naturalistic conditions (Kazdin and Nock 2003, Thurin and Briffault 2006). A research network based on Psychotherapies' Practices (RRFPP) was established on this basis (Thurin et al., 2008). The objective of one of its poles is to understand why and how psychotherapy conducted by experienced practitioners may be effective in children / adolescents with autism spectrum disorders. An article presenting the preliminary results of the first 50 cases was published (Thurin et al. 2014), as well as a general report prepared following a first level of analysis (Thurin Thurin Falissard & 2013).

A second generation of statistical methods developed since the early 90s, including that of structural equation modeling. This method allows to combine multiple linear regression analyzes and design «paths» or «causal paths.» It is also possible to consider the latent variables apprehended from variables measures involved in their construct or their expression (Falissard 2005, pp 203-215, 2011, pp 205-221, Hair et al. 2014). The possibility of applying this method to data collected in the network was first tested using isolated cases. Their analysis developed with R showed great diversity of individual situations and adjusting to the needs and therapists possibilities of each patient. This individualized and interactive dynamics seemed to make impossible any possibility of modeling the process with a group. However, the application of a basic model has also shown the benefits of formalization of psychotherapy steps and ingredients from component variables psychotherapeutic process and those that make up the indicators of change. This poster presents the first phase of this work.

## METHODOLOGY

### Objective of the structural model

This model attempts to explain the action of psychotherapy (AT) exerted in its natural context on autistic behaviors of the child. This model uses data from RR-FPP where 60 children and adolescents with autism and PDD were assessed 4 times for a period of one year (initially and then at 2, 6 and 12 months) as part of a intensive case study.

Assessments are conducted individually by three clinicians gathered in peer group. The interrater variance are discussed until approved agreement.

The behavioral state (EC) is measured by two dimensions: the relational disabilities (CD) and impaired emotion modulation (IM), from the two corresponding scales in the ECAR.

The therapeutic action (AT) is a latent variable that involves the therapist in his approach and technique, the child and functioning, and their interaction. It is represented by the attitude of the therapist (ATT) and its specific actions (ACT) centered on verbalization, language, emotion and pathological behaviors that accompany them. It also involves the psychological disposition of the child, which determines its openness and participation in therapeutic activities. The child's psychological state is formed by a group of items (AAR) of the process scale (CPQ) that capture his activity, his inner experience and its relationship with the therapist as part of psychotherapy. These items describe the pathological and normal components of these dimensions \*. ECAR and CPQ are two validated scales.

### Construction of the model

It builds on the findings of in-depth analysis performed of single cases with R and methods presented by B Falissard and Hair.

The first step was the creation of a first graph involving variables to explain (CD and IM) and the explanatory variables (ATT, ACT and AAR).

The second step was the selection of explanatory variables. It was carried out from the squared cosines of the observations (items CPQ).

The third step was the test of their commitment to the 3-time feedback from linear regression equations (2, 6 and 12 months).

## RESULTS

```
Call:
lm(formula = cpecar_red[, 15] ~ cpecar_red[, 1] + cpecar_red[, 2] + cpecar_red[, 3], data = cpecar_red)

Residuals:
    Min       1Q   Median       3Q      Max
-5.059  -9.334   0.608   8.083  40.148

Coefficients:
(Intercept)      48.69289      6.22145      7.827 1.49e-10 ***
cpecar_red[, 1]  -0.21048      0.09671     -2.177  0.0338 *
cpecar_red[, 2]  -0.20191      0.08691     -2.323  0.0238 *
cpecar_red[, 3]  -0.02599      0.06316     -0.411  0.6823
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 13.85 on 56 degrees of freedom
Multiple R-squared:  0.1824, Adjusted R-squared:  0.1386
F-statistic: 4.164 on 3 and 56 DF, p-value: 0.009868
```

The variable « relational disability » of the child to T02 (DR02) is significantly dependent on the psychological disposition of the child (AAR02) (0.03) and the attitude of the therapist (ATT02) (0.02) at T02.

```
Call:
lm(formula = cpecar_red[, 16] ~ cpecar_red[, 2] + cpecar_red[, 4] + cpecar_red[, 5] + cpecar_red[, 6], data = cpecar_red)

Residuals:
    Min       1Q   Median       3Q      Max
-27.419  -8.172   0.104   7.858  35.249

Coefficients:
(Intercept)      39.41348      6.53846      6.028 1.45e-07 ***
cpecar_red[, 2]  -0.23010      0.09968     -2.308  0.02476 *
cpecar_red[, 4]  -0.30982      0.09114     -3.399  0.00126 **
cpecar_red[, 5]  -0.15856      0.10139      1.564  0.12361
cpecar_red[, 6]  -0.06143      0.06247     -0.983  0.32974
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 13.24 on 55 degrees of freedom
Multiple R-squared:  0.2608, Adjusted R-squared:  0.207
F-statistic: 4.851 on 4 and 55 DF, p-value: 0.00201
```

The variable « relational disability » of the child to T06 (DR06) is significantly dependent on the psychological disposition of the child (AAR06) to T06 and the attitude of the therapist (ATT02) to T02.

```
Call:
lm(formula = cpecar_red[, 17] ~ cpecar_red[, 7] * cpecar_red[, 9] + cpecar_red[, 8], data = cpecar_red)

Residuals:
    Min       1Q   Median       3Q      Max
-28.473  -8.779  -1.876   4.640  35.332

Coefficients:
(Intercept)      39.253158     10.072547      3.897 0.000267 ***
cpecar_red[, 7]  -0.938437      0.325017     -2.887 0.005544 **
cpecar_red[, 9]  -0.275663      0.124145     -2.221 0.030523 *
cpecar_red[, 8]  0.095777      0.106622      0.898 0.372947
cpecar_red[, 7]:cpecar_red[, 9] 0.009588      0.005704      1.681 0.098467 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 13.41 on 55 degrees of freedom
Multiple R-squared:  0.28, Adjusted R-squared:  0.2276
F-statistic: 5.347 on 4 and 55 DF, p-value: 0.001039
```

The variable « relational disability » of the child to T12 (DR12) is significantly dependent on the disposition of the Child (AAR12) (0.005), the action of the therapist (ACT12) (0.03), and their interaction (0.09) to T12.

Linear regressions for Relational impairment of the child (CD) establish that the «child in his/her therapy» mediator (AAR) is very significant to each of quotations. The attitude of the therapist is also significant to each of the quotes to a lesser extent. The action of the therapist (ACT) is only weakly significant at 6 months of therapy and intervenes on DR at 12 months. The lack of correlation with the lack of emotion modulation (IM) can be explained by the fact that this deficit strongly concerned about a quarter of children (17/60).

## REFERENCES

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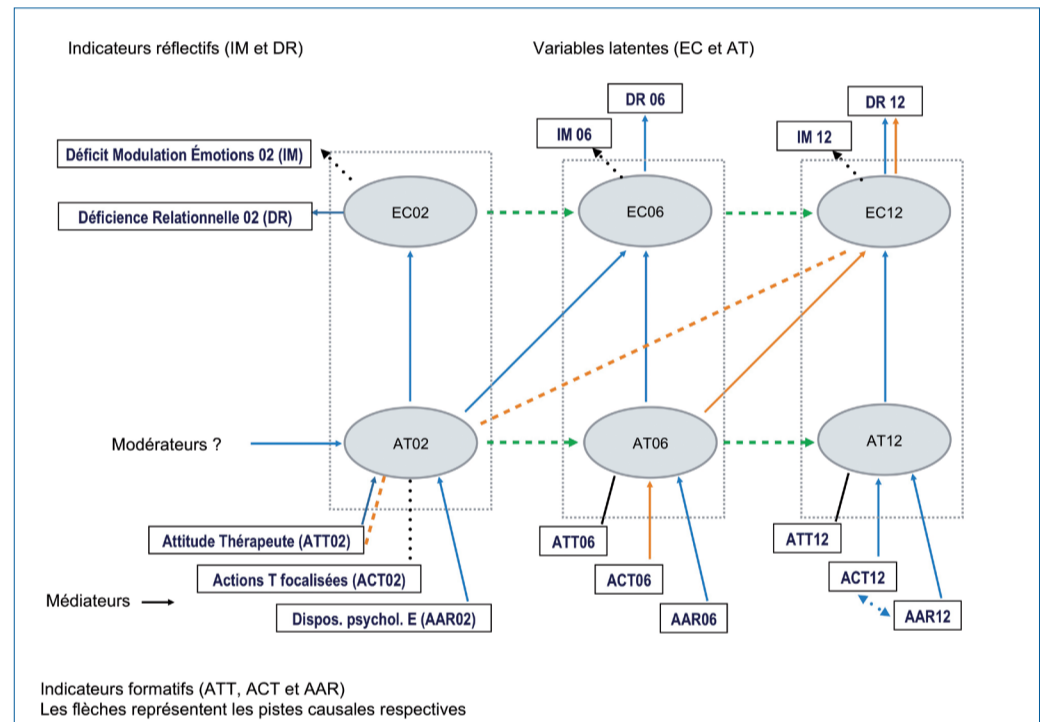
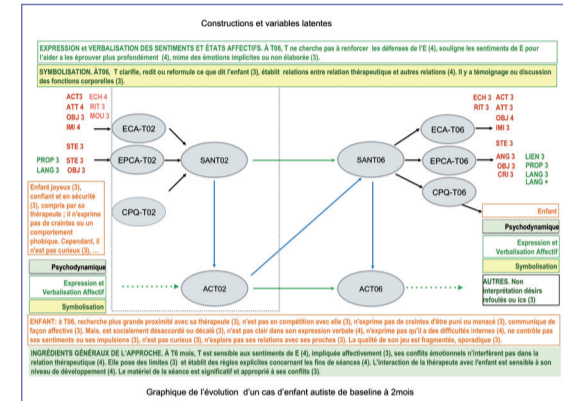
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The first graph shows an extract of modeling an single case and the second graph represents a first modeling of the 60 cases' group.