Correlations: Overall Liking

	1. Order Test	2. Order Test	3. Order Test	5. Order Test	1. Order Own	2. Order Own	3. Order Own
1. Order Test							
2. Order Test	0,1						
3. Order Test	0,1	0,2					
5. Order Test	0,1	0,2	0,2				
1. Order Own	0,0	0,1	0,1	0,1			
2. Order Own	0,0	0,2	0,1	0,1	0,7		
3. Order Own	0,0	0,1	0,2	0,1	0,6	0,7	
5. Order Own	0,0	0,1	0,1	0,1	0,5	0,6	0,6

Table 1: Overall Liking; correlations between order for test product and regular brand (Own).

Correlations: Flavour Liking

	1. Order Test	2. Order Test	3. Order Test	5. Order Test	1. Order Own	2. Order Own	3. Order Own
1. Order Test							
2. Order Test	0,1						
3. Order Test	0,1	0,2					
5. Order Test	0,1	0,1	0,2				
1. Order Own	0,0	0,1	0,0	0,0			
2. Order Own	-0,1	0,1	0,0	0,1	0,6		
3. Order Own	0,0	0,1	0,1	0,0	0,5	0,6	
5. Order Own	0,0	0,1	0,0	0,1	0,4	0,5	0,5

Table 2: Flavour Liking; correlations between order for test product and regular brand (Own).
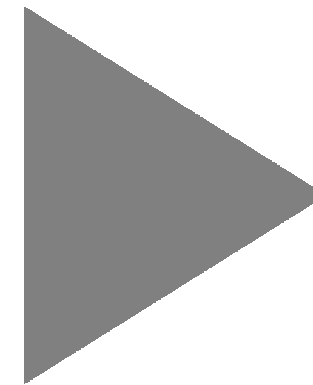
Respondent effects in multiple product sequential monadic tests

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Objective:
To understand respondent effects in consumer product testing which might influence preference mapping studies.

Study design:
A number of multiple product sequential monadic (home) placement tests were conducted with an identical product (placed 4-times) and one different product. Analysed were the results of those respondents who judged all 4 of the identical products (N=660).

Results:
The order effect in multiple sequential monadic tests is strongest for 1st and levels out after the 3rd order. It seems to be due to respondents scale adjustments. Correlations between follow-up ratings are extremely low. On a respondent basis it is impossible to predict the rating of any product in the sequence from any other product rating within the range of identical products. Conclusions: Segmenting respondents based on individual judgement (e.g. for preference mapping) requires a balanced product matrix with more than one product per taste category and greater differences between products (e.g. determined by physical/chemical and sensory profiling data). As an alternative monadic test with independent (matched) consumer samples should be considered.

Introduction
As long as we compared the "liking" means of products, we were not too concerned by the order effect. However, when we started with preference mapping, which requires analysing (grouping) respondents by their liking scores, we were wondering whether the order effect could produce spurious results.

In a first step we reanalysed quite a number of multiple product studies which were conducted in different markets in Europe. The results were:
- All types of pattern were found: increasing and decreasing (most often) but also no order effect at all.
- In case of increasing or decreasing order effect, it seemed that the "liking" means stabilised from 2nd or 3rd order onwards (Figure 1).
- In one market (Germany), we always had an increasing order effect with one research agency and a decreasing one with another agency. The only obvious difference between the agencies was CATI versus face-to-face (Figures 2 and 3).

To better understand the order effect a study was initiated in which the same product was placed 4-times and a different product only once either on 3rd respectively 4th order.

Study Design
The test was conducted as sequential monadic home placement. Test products (one pack with 20 cigarettes) and questionnaire were sent by mail. The product placements were spaced by a 14 day period during which the respondents consumed their regular brand. The reason was to avoid carry over effects and comparisons between test products. The test product was the respondent's usual (disguised) brand. One day after the respondents received the test product, they were interviewed via telephone (CATI). Respondents were asked to rate the test product on a number of "liking" attributes (flavour and overall liking, preference and taste similarity in relation to their regular brand). In addition, respondents rated their own brand from memory at each order (flavour and overall liking). Total number of respondents which comprising the studies were N=660.

Results
The previous findings of a positive order effect which was strongest between 1st and 2nd order were confirmed (Figure 3). By comparing the raw score distribution between 1st and the following orders (Figure 4), it is assumed that the shift toward higher scores is primarily due to scale adjustment. Expectations about the taste range of the following test products may have had an additional influence.

A rather small proportion of 22-29% of the respondents repeated their rating score in the follow-up judgement (Figure 5), but only 4% in all 4 repetitions. Correlations between all 4 follow-up judgements and between test product[1]) and the rating of regular brand are extremely low (Tables 1 and 2). A stronger correlation (around r=0.5) exists between the regular brand by order ratings.

That means, on a respondent basis, it is impossible to predict the rating of any product in the sequence from any other product rating within the range of identical products. Comparable overall liking means (2nd, 3rd, 5th order) are therefore due to a comparable raw score distribution within the total sample, but not due to a certain distribution of respondents with different degrees of liking. This finding is in agreement with an Alfed Politz's statement[2]):
"The observational powers of a group of individuals are greater than the sum of the observational powers of the individuals who make up the group."

Conclusions
These findings have some consequences for planning a preference mapping study:
1. To account for the order effect, dummy products (e.g. own brand blind) should be given at 1st and 2nd order.
2. To take account of the within respondent "liking" variance, the same product should be placed at least 3-times. Alternatively an equal number of products belonging to the same taste category (e.g. determined by chemical/physical and sensory profiling data) could be used.
3. It seems reasonable to consider monadic tests with independent matched samples for the purpose of preference mapping.

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[1]) *These correlations between follow-up ratings of the test product are only marginally higher than between a random combination of 4 test results taken from monadic testing of the same brand over a certain period of time (not published yet).*

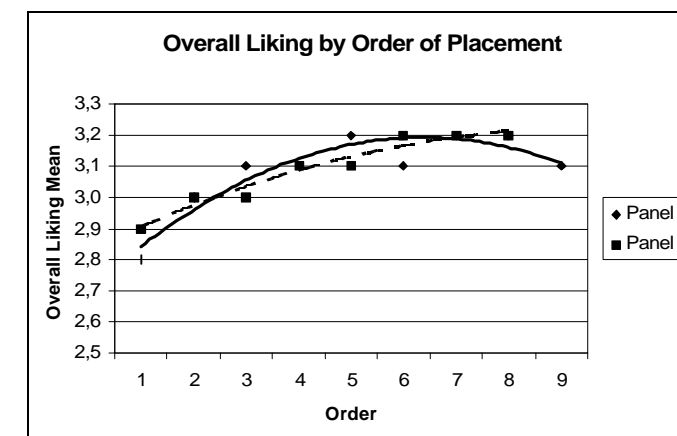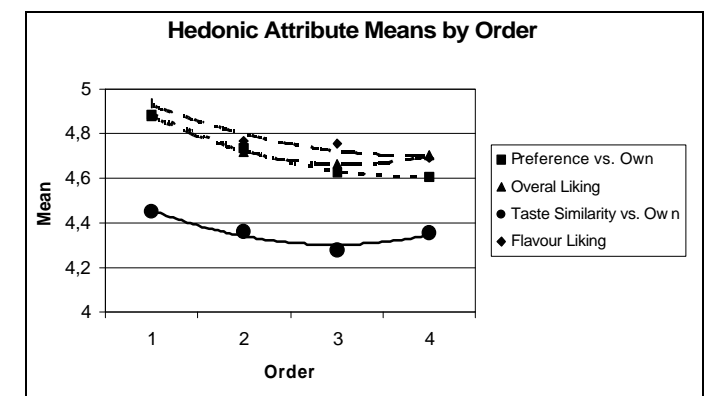[2]) *Hugh S. Hardy, Editor (1990) The Politz Papers (p. 33). Chicago: American Marketing Association*

Figure 2: Decreasing attribute mean by order of placement. Scale was 7-point magnitude. Survey type: face-to-face.
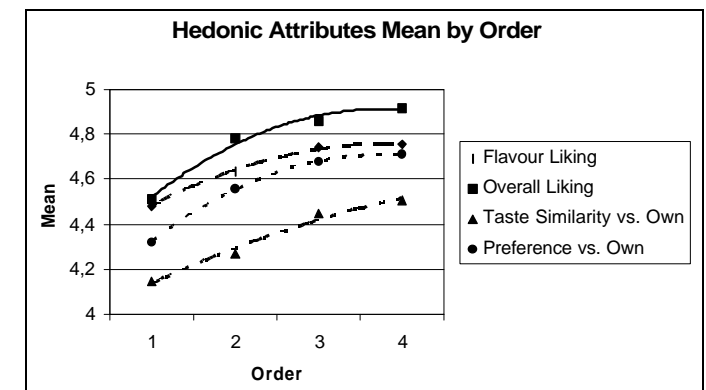

Figure 3: Increasing attribute mean by order of placement. Scale was 7-point magnitude. Survey type: CATI.
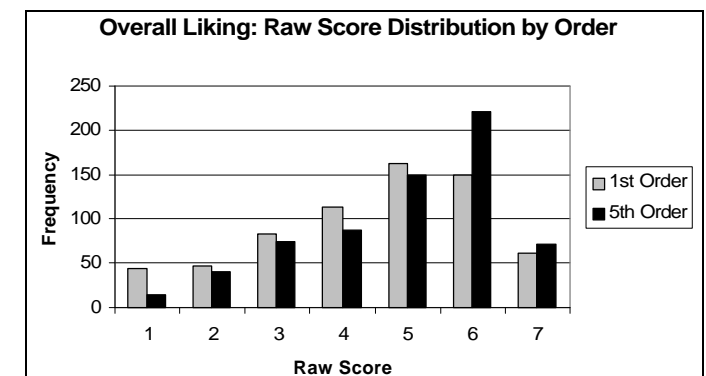

Figure 4: Raw score distribution for the same product placed on 1st and 5th order, N=660.

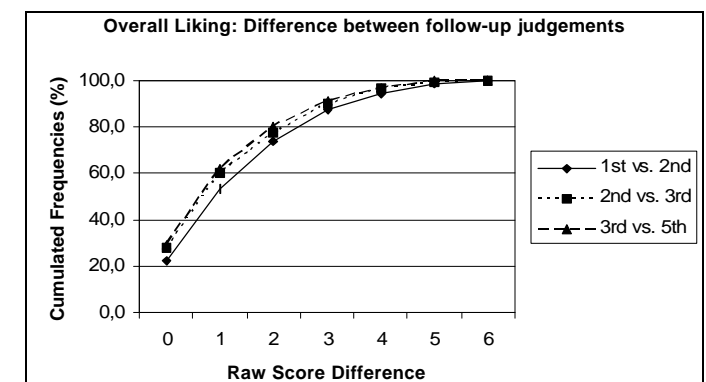*Figure 1: Overall liking mean by order of placement. Scale was 5-point magnitude.*

Figure 5: Proportion of respondents who kept (0), changed their ratings (by ±1 towards ±6) in follow-up tests of the same product.