

Latent Variable Equivalence: Towards a Quantitative Emic Approach to Cross-Cultural Comparisons

Klaus Boehnke

Jacobs University Bremen, Germany

and

Higher School of Economics, Moscow, Russia



JACOBS
UNIVERSITY

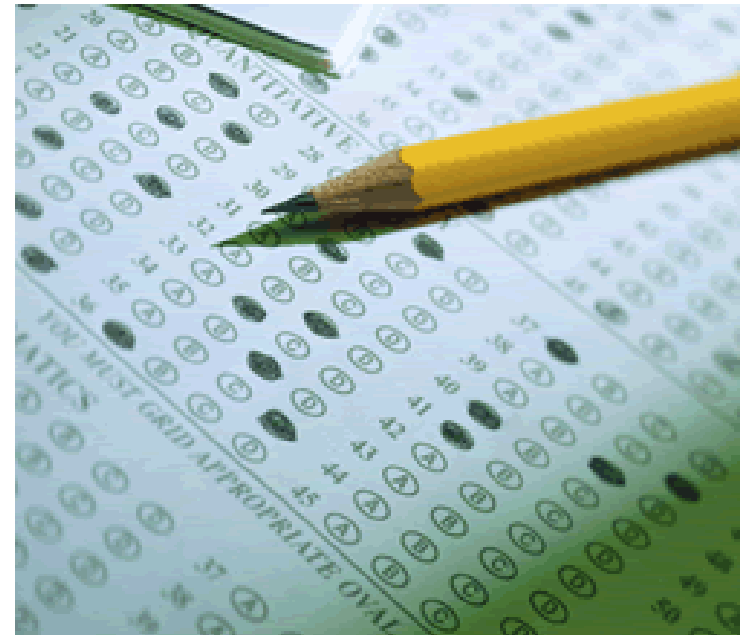


JACOBS
UNIVERSITY

**THE NUMBERS DON'T
REMEMBER WHERE
THEY CAME FROM
(Lord, 1953)**



JACOBS
UNIVERSITY





Functional Equivalence



JACOBS
UNIVERSITY





Conceptual Equivalence



JACOBS
UNIVERSITY





JACOBS
UNIVERSITY

Functional Equivalence

agreed upon by researcher consensus

Conceptual and Metric Equivalence

tested via Structural Equation Modeling

If test successfully

equivalence of meaning across cultures assumed

→ cross-cultural comparison (of scores) possible

Unstated side-assumption:

Linguistic “sameness” is the only guarantee that equivalence of mathematical matrices can be taken as evidence for cross-cultural equivalence of meaning



JACOBS
UNIVERSITY

Our ‘credo:’

**If equivalence of mathematical matrices is given,
linguistic “sameness” is not necessary to allow for
cross-cultural comparability of scores**

**This allows for an emic formulation of instruments once
functional equivalence of a construct is agreed upon**

AND

**an identical relationship of the scores on the emically
constructed instrument with a third variable can be
proven**

Ideally the third variable would come from ‘hard science’.



JACOBS
UNIVERSITY

Steps for (Illustrating) the Construction of Emic Instruments of Paternal Warmth

Students from *n* language communities develop 10-item scales of paternal warmth for their own culture of upbringing/language community, **independently**.

Each student solicits a convenience sample of $N \geq 30$ from his/her home culture.

Scales are submitted to within-culture principle component analyses; items are ordered by size of loading. Items not loading with a minimal loading of .40 are excluded from further analyses. The minimal number of sufficiently loading items in a particular country determines the number of items used for cross-cultural analyses.



JACOBS
UNIVERSITY

Questionnaires also contain a question on gender, on age, and the trust item from the World Values Survey (WVS) with the response format used for that item in the European Social Survey.

In English, the trust item reads:

“Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? Please tell me on a score of 0 to 10, where 0 means ‘**you can’t be too careful**’ and 10 means that ‘**most people can be trusted.**’



Sample Characteristics



JACOBS
UNIVERSITY

Language	N	Percent Female	Mean Age (SD)
English (Zambia)	30	50%	21.3 (2.6)
French (Togo)	34	62%	24.1 (5.4)
German (Germany)	30	53%	20.6 (1.0)
Russian (Moldova)	31	55%	21.8 (7.0)
Shona (Zimbabwe)	30	63%	20.8 (3.1)



Scale used for Zambian Subsample



JACOBS
UNIVERSITY

Language	Item Wording	Item Loading
English (Zambia)	My father ...	
	... spent as much time as he could with us	.90
	... gave the best example to me and my siblings	.82
	... provided for me and the family	.82
	... was loving and caring	.77
	... helped me with my homework	.68
	... did not do any chores around the house	.59
	... did not raise his voice to my mother in front of me and my siblings	.51
	... walked me to school every morning	.50
	... was very concerned about my health and well being	.42
	... did not hit me and my siblings	.12



Scale used for Togolese Subsample



JACOBS
UNIVERSITY

Language	Item Wording	Item Loading
French (Togo)	Mon père ...	
	... était très engagé dans mon instruction scolaire	.84
	... me souhaitait bonne nuit avant que je n'aille au lit	.70
	... m'aidait à faire mes devoirs quand il avait du temps libre	.66
	... semblait toujours intéressé par ce que j'avais à dire	
	... m'offrait des petits cadeaux de temps en temps	.62
	... faisait du vélo avec moi (ou d'autres activités sportives)	.58
	... mangeait avec moi à l'heure du diner	.57
	... me punissait lorsque je faisais des bêtises	.57
	... me lisait des histoires avant que je n'aille au lit	.56
	... me demandait toujours comment ma journée à l'école s'était passée lorsqu'il rentrait du boulot	.56 .55



Scale used for German Subsample



JACOBS
UNIVERSITY

Language	Item Wording	Item Loading
German	Mein Vater	
(Germany)	... hat mich immer darin unterstützt meinen Interessen nachzugehen.	.91 .90
	... hörte mir immer zu, wenn ich über etwas reden wollte.	.89
	... hat sich regelmäßig nach meinen Problemen und meinem Befinden erkundigt.	.87
	... gab mir das Gefühl, geschützt zu sein, wenn ich Angst hatte.	.85
	... hat mir jeden Abend, bevor ich schlafen gegangen bin, eine gute Nacht gewünscht.	.82
	... stand immer hinter mir, auch wenn ich einen Fehler gemacht hatte.	.78 .52
	... hat mich auf den Arm genommen, um mich zu trösten.	-.36
	... hat gerne viele Geschichten über mich vor Anderen erzählt.	-.27
	... hat mich oft körperlich bestraft.	
	... hat mich vor allem mit “Sohn”/”Tochter” angesprochen.	



Scale used for Moldovan/Russian Subsample



JACOBS
UNIVERSITY

Language	Item Wording	Item Loading
Russian	Мой отец....	
(Moldova)	... хвалил меня, когда я делал/а что-то хорошо	.92
	... был очень заботливый со мной	.91
	... поддерживал меня, когда у меня была проблема	.89
	... обычно показывал мне, что он гордился мной	.85
	... использовал положительный физический контакт, чтобы показать свою любовь	.77
	... проводил выходные со мной в большинстве случаев	.77
	... был очень понимающим, когда я делал/а что-то неправильно	.77
	... обычно говорил мне, что он гордился мной	.76
	... был всегда доступен, когда я нуждался/нуждалась в совете	.72
	... помогал мне делать домашнее задание по крайней мере раз в неделю.	.39



Scale used for Zimbabwean (Shona-speaking) Subsample



JACOBS
UNIVERSITY

Language	Item Wording	Item Loading
Shona (Zimbabwe)	Wakasunununguka nababa vako zvekuvambundira kazhinji.	.93
	Baba vako vanombokupawo zvipo here apo ne apo.	.78
	Kana ukawirwa nedambudziko kuchikoro, baba vako vanotaurika navo.	.77
	Unotaurawo nababa vako kazhinji.	.73
	Baba vako vanombokutaurirawo kuti vanodada newe kana uchinge wagona.	.63 .62
	Kana ukatadza, baba vako havangokurova asi vanotaura newe kuti unzwisise kutadza kwako.	.61
	Unombofambawo nababa vako uchivhakacha murivaviri.	.56
	Kana ukaita shamwari yawanetsana nayo ringave dambudziko raunotaurira baba vako.	.50
	Baba vako vakanzwa kuti pane umwe mwana arikukunetsa kana kukudenha vanopindirawo.	.48
	Baba vako vanorangarirawo bhavhudhe rako.	
		.



Language/ Culture	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7	ITEM 8	β PW→ T ^a
English (Zambia)	.89	.89	.89	.87	.66	.49	.54	.41	.40
French (Togo)	.89	.62	.58	.58	.66	.46	.51	.56	.40
German (Germany)	.89	.92	.87	.87	.66	.80	.72	.56	-.07
Russian (Moldova)	.89	.91	.85	.73	.66	.69	.69	.59	-.07
Shona (Zimbabwe)	.89	.75	.75	.68	.66	.57	.58	.56	.40



JACOBS
UNIVERSITY

Summary

Unifactorial structure of paternal warmth can be shown for all included cultures.

Loading equivalence can be shown for two items

Stricter demands of equivalence can only be shown for at most two items across the five cultures (details omitted).

The relationship between paternal warmth and trust is identical and significant in the three African cultures; it is identical also in the two European samples, but insignificant in size and with a counterintuitive sign.

Partialling for gender and age does not change results.



JACOBS
UNIVERSITY

Further steps for (Illustrating) the Construction of Emic Instruments of **Paternal Warmth**

Students from different language communities develop 10-item scales of paternal warmth for their own culture of upbringing/language community, **independently**.

Each student solicits a convenience sample of $N \geq 50$ from his/her home culture.

Scales are submitted to within-culture principle component analyses; items are ordered by size of loading. Items not loading with a minimal loading of .40 are excluded from further analyses. The minimal number of sufficiently loading items in a particular country determines the number of items used for cross-cultural analyses.



JACOBS
UNIVERSITY

Additionally, questionnaires contain eight items from the Nurturant Father Scale (NFS, Parker, Tupling, & Brown, 1979, translated to the eleven non-English languages.

In English, the 8 item reads:

My father spoke to me in a warm and friendly voice.

My father did not help me as much as I needed it. (-)

My father enjoyed talking things over with .

My father made me feel I wasn't wanted. (-)

My father could make me feel better when I was upset.

My father did not praise me. (-)

My father did not care what I did. (-)

My father was never around when I needed him. (-)



Sample Characteristics



JACOBS
UNIVERSITY

Language	N	Percent Female	Mean Age (SD)
Spanish (Latin America)	76	56	23.6 (5.7)
Urdu (Pakistan)	41	54	21.4 (3.1)
French (Senegal)	89	64	19.1 (2.6)
German (Switzerland)	74	43	34.7 (15.3)
Malay (Malaysia)	96	56	36.0 (12.0)
Burmese (Myanmar)	37	27	21.4 (4.0)
Arabic (MENA)	99	78	29.3 (12.0)
Chinese (PRC)	69	68	29.3 (12.8)
Georgian (Georgia)	54	80	25.3 (9.8)
German (Germany)	60	42	20.8 (2.7)
Korean (Republic of Korea)	54	59	21.7 (2.3)
English (Non-resident Indian)	38	50	21.2 (2.6)



**AACSB
UNIVERSITY**

Language	Item Loadings									
	IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10
Spanish	.892	.885	.850	.821	.797	.792	.653	.643	.461	<.40
Urdu	.846	.777	.722	.720	.634	.582	.496	<.40	<.40	<.40
French	.811	.795	.776	.750	.732	.729	.726	.656	.631	.413
German (CH)	.865	.813	.798	.772	.771	.730	.702	.633	.623	<.40
Malay	.855	.854	.807	.770	.768	.755	.750	.561	<.40	<.40
Burmese	.914	.880	.860	.856	.852	.840	.834	.667	<.40	<.40
Arabic	.853	.843	.824	.791	.760	.717	.711	.701	.520	.423
Chinese	.840	.833	.814	.793	.766	.743	.695	.687	.599	.584
Georgian	.848	.829	.822	.796	.736	.715	.657	.652	.498	<.40
German (D)	.896	.895	.858	.835	.825	.764	.737	.732	.732	.600
Korean	.878	.832	.825	.812	.781	.765	.764	.756	.726	.639
English (NRI)	.884	.877	.856	.828	.824	.800	.788	.712	.691	.470



Percent of Variance Explained by First Factor



JACOBS
UNIVERSITY

Language	Self-developed Paternal Warmth Scale	Nurturant Father Scale
Spanish (Latin America)	58.8	41.4
Urdu (Pakistan)	35.8	34.4
French (Senegal)	50.5	46.1
German (Switzerland)	51.7	47.9
Malay (Malaysia)	47.7	43.7
Burmese (Myanmar)	58.2	35.3
Arabic (MENA)	52.8	56.1
Chinese (PRC)	54.9	40.8
Georgian (Georgia)	49.7	38.6
German (Germany)	62.8	40.7
Korean (Republic of Korea)	60.9	33.7
English (Non-resident Indian)	61.1	55.7

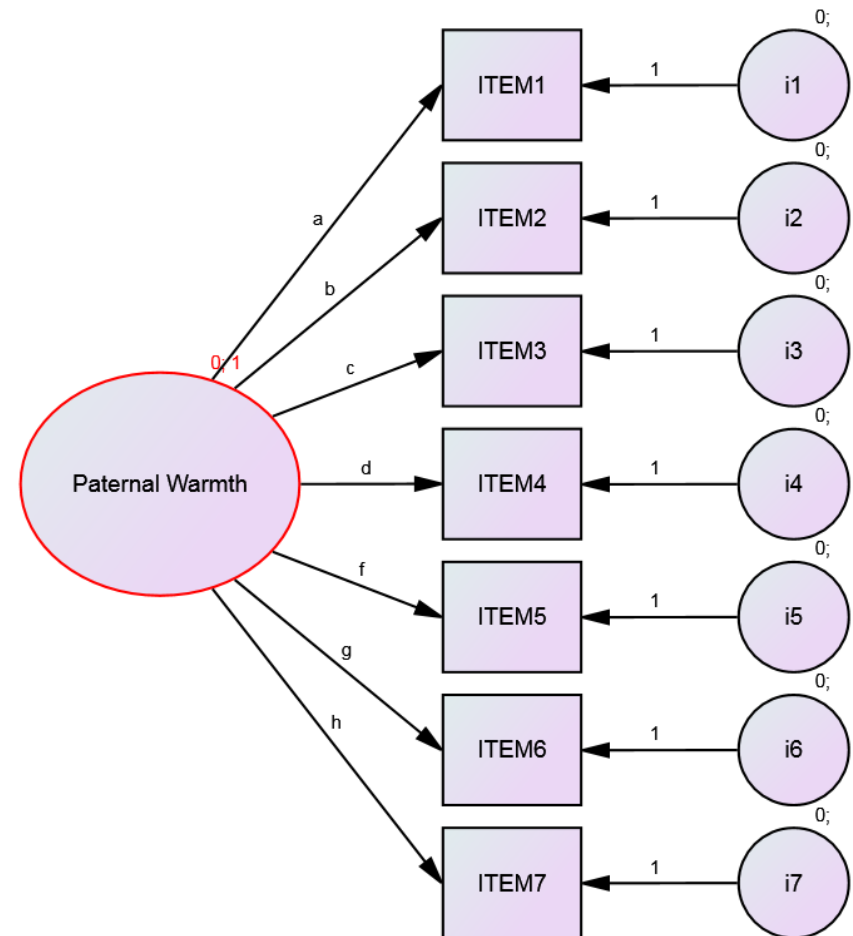


Confirmatory 12-Sample Factor Analysis of Paternal Warmth Scales



JACOBS
UNIVERSITY

- All loadings significant and above .40
- Loadings equal across **all twelve** language versions
- **NO** equal intercepts of items
- Equal item error terms **only for Item 3**
- Sufficient goodness of fit for one-factor solution.



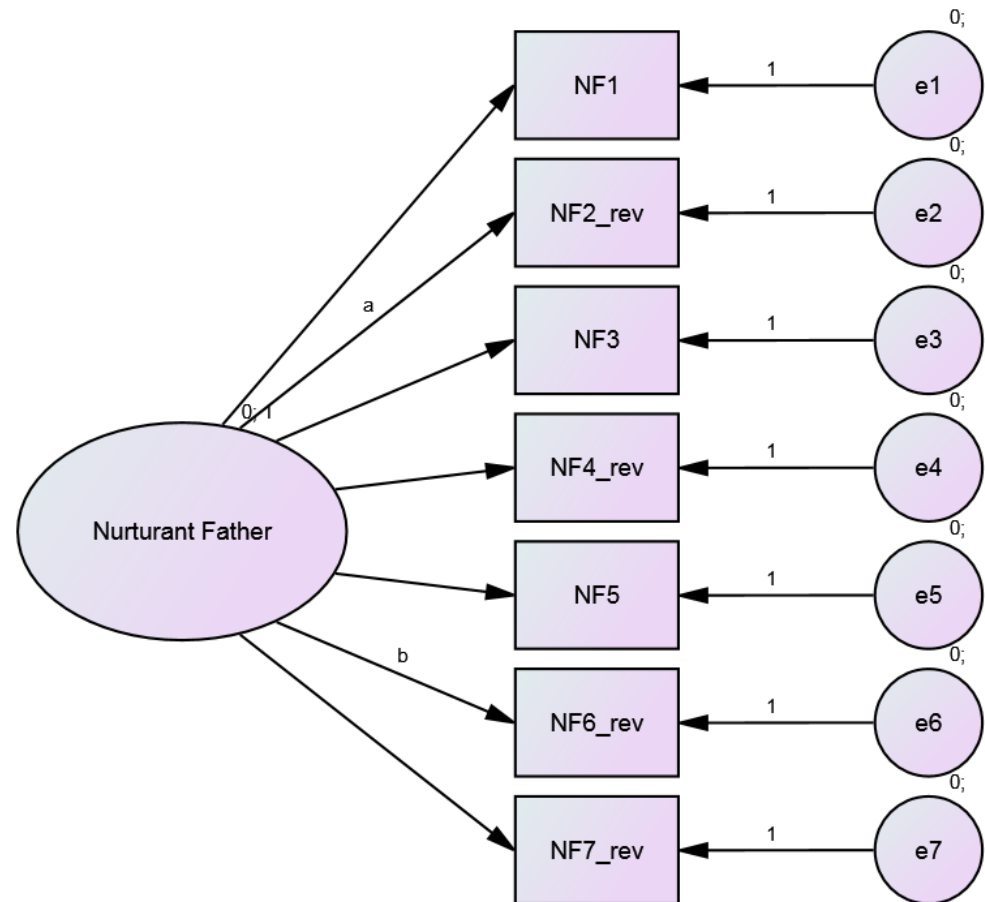


Confirmatory 12-Sample Factor Analysis of Nurturant Father Scales



JACOBS
UNIVERSITY

- Numerous loadings insignificant and below .40 in several of the 12 samples
- Only two loadings equal across **all twelve** language versions
- **NO** equal intercepts of items
- No equal item error terms for any item
- Sufficient goodness of fit for one-factor solution.



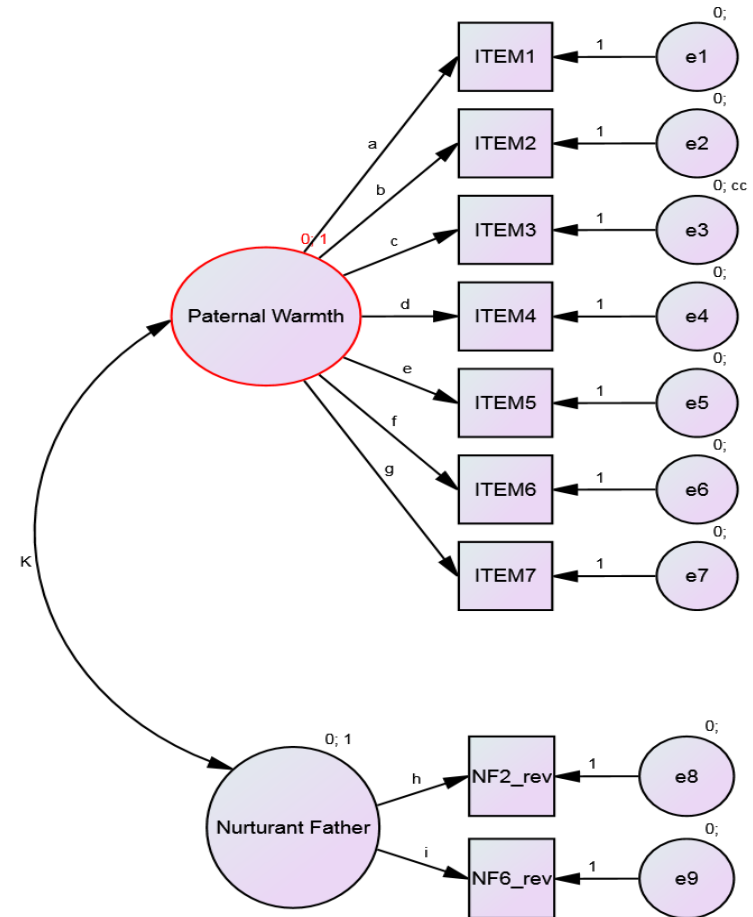


SEM Model for Paternal Warmth and Nurturant Father Scales



JACOBS
UNIVERSITY

- Equal covariance between the Paternal Warmth and the Nurturant Father Scale in **seven** samples: Spanish_LA, Urdu, French_Sen, Georgian, German_D, Korean, English_NRI
- Sufficient goodness of fit



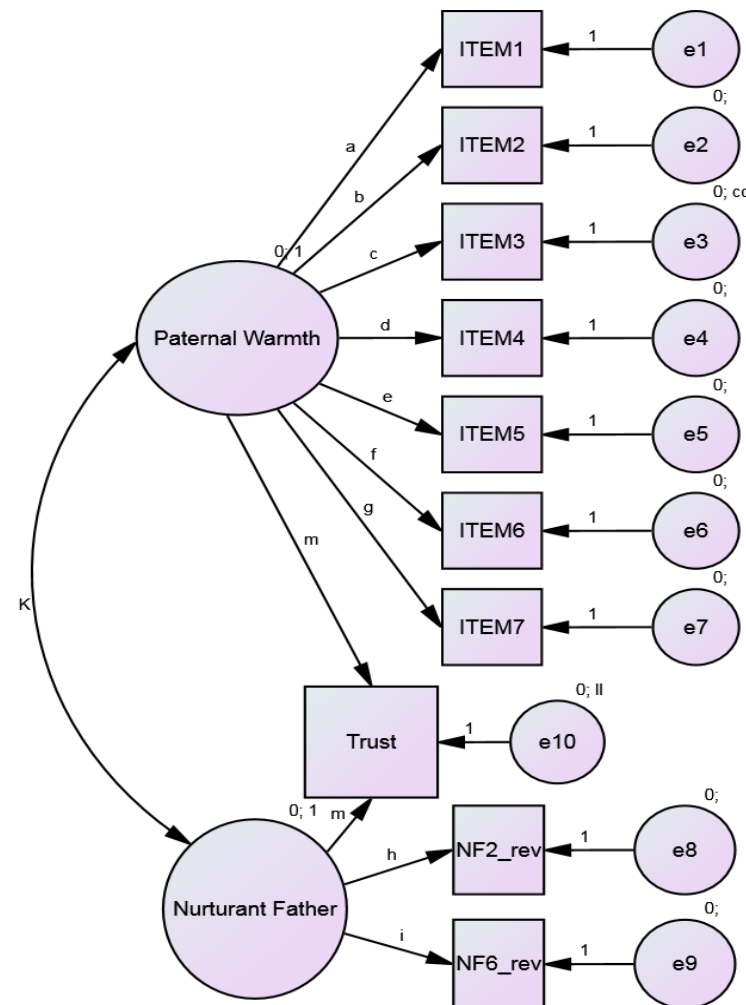


SEM Model for Paternal Warmth and Nurturant Father Scales plus Generalized Trust



JACOBS
UNIVERSITY

- Equal covariance between the Paternal Warmth and the Nurturant Father Scale **and** equal relationship with 'trust' in **three** samples: Spanish_LA, French_Sen, Korean
- Equal intercepts for trust
- Equal error terms for trust
- Sufficient goodness of fit.





JACOBS
UNIVERSITY

- Developing paternal warmth scales **emically** secures more construct validity than using (and translating) an internationally well-accepted scale
- To achieve metric and scalar equivalence for emic (= differently worded per sample) is difficult but in principle possible
- Latent variable equivalence of emic scales across cultures can be shown



JACOBS
UNIVERSITY

Thank you for
your attention!