How does speaking more than one language improve our creative abilities?

Anatoliy V. Kharkhurin

Creativity As a Process

- **Guilford (1967)**
  - **Divergent thinking**
    - **Generation of a multitude of often unrelated ideas**
  - **Convergent thinking**
    - **Extracting creative ideas from the pool of those generated during divergent thinking**

Creativity

- **An ability to initiate multiple cycles of divergent and convergent thinking,**
- **which creates an active, attention-demanding process**
- **that allows generation of new, alternative solutions**
- **characterized by**
  - **novelty (original or unexpected)**
  - **appropriateness (useful or meeting task constraints)**
- **Everyone has this ability, but it's realized differently in different individuals (Creative Cognition, Ward, Smith, & Finke, 1999)**

Bilingualism

- **Bilinguals are individuals who are fluent in two languages, individuals who actively use, or attempt to use more than one language, even if they have not achieved fluency in their second language (Kroll & de Groot, 1997)**

Bilingualism & Creativity

- **Bilinguals > Monolinguals**
  (see Ricciardelli, 1992, for an overview)

- **Contradiction**
  - **If bilingualism would have positive influence on creative abilities, then we should find the outbursts of creativity in the bilingual countries (e.g., Belgium, Canada, Switzerland)**
  - **This is not the case**

Why are these contradictions there?

1. **The possible superior creative abilities of bilingual children do not persist into adulthood**

2. **"C" vs. "c" creativity**
   - **Bilinguals show greater performance on the divergent thinking (DT) measures that do not tap into the prominent creative behavior**

3. **Cultural element**
   - **Bilingual groups included immigrants who in addition to speaking two languages also were likely to experience and participate in two cultures**

Methodology

- **Participants**
  - **college students**
- **Within-bilingual design**
  - **Language proficiency**
  - **Age of acquisition**
  - **Multicultural experience**

Testing Materials

- **Biographical questionnaire (Kharkhurin, 2008)**
  - http://surveys.aus.edu/index.php?sid=41455
- **Picture Naming Test (PNT)**
  - language proficiency in L1 & L2
  - http://surveys.aus.edu/index.php?sid=62786
- **Abbreviated Torrance Test for Adults (ATTA, Goff & Torrance, 2002)**
  - divergent thinking (DT)
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PNT (excerpt of one page of the test)

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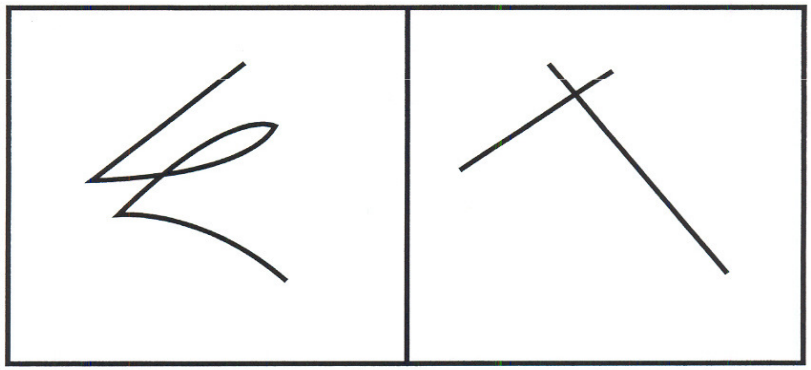
ATTA Activity 1

Just suppose you could walk on air or fly without being in an airplane or similar vehicle.
What problems might this create? List as many as you can.

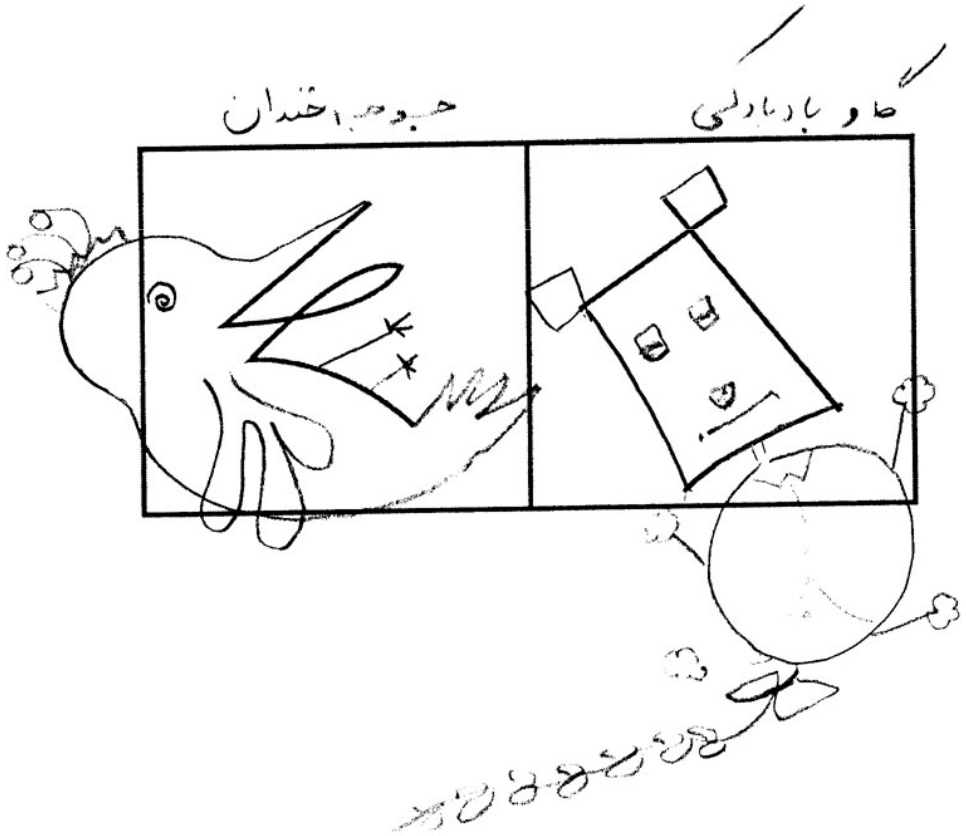
ATTA Activity 2

Use the incomplete figures below to make some pictures. Try to make your pictures unusual. Your pictures should communicate as interesting and as complete a story as possible.



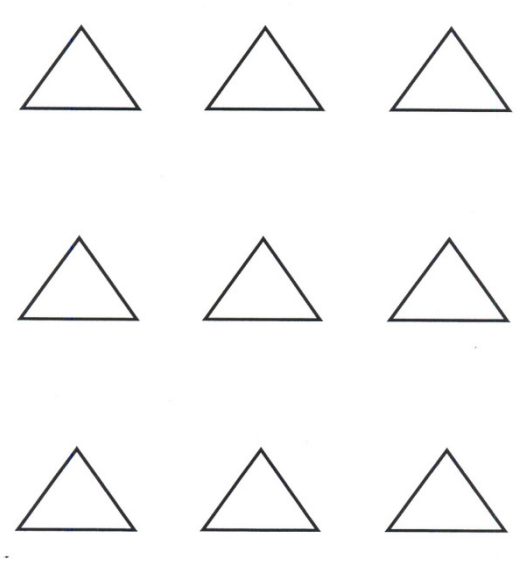
ATTA Activity 2

- **Case 56**



ATTA Activity 3

See how many objects or pictures you can make from the triangles below, just as you did with the incomplete figures.



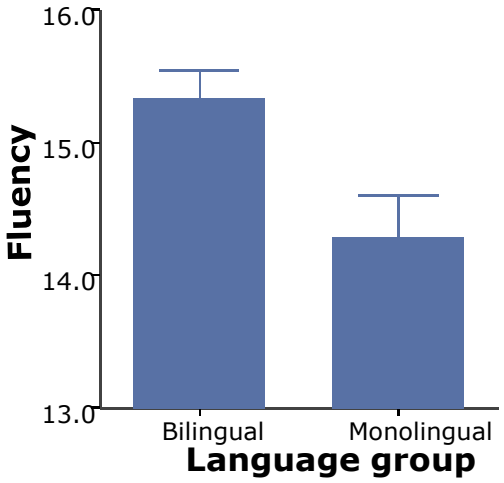
ATTA Activity 3

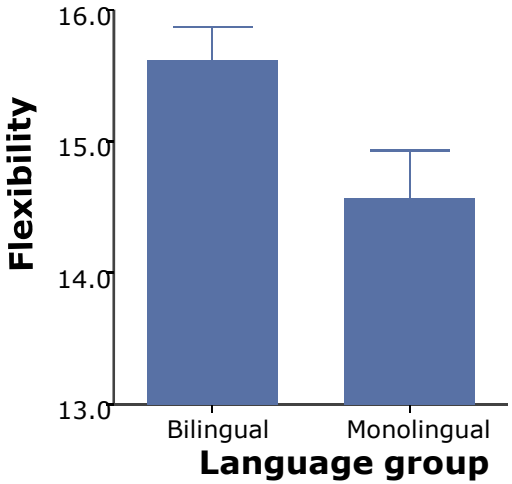
- **Case 17**

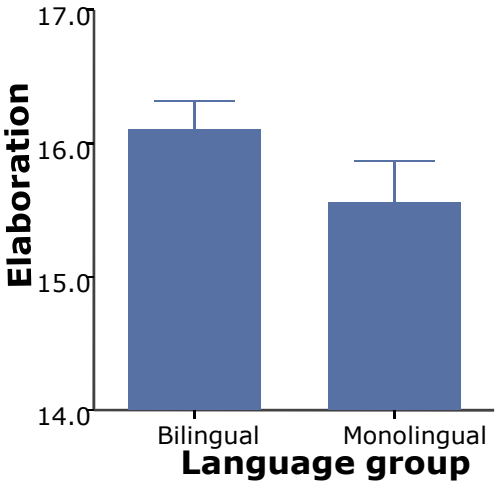
Divergent Thinking Assessment

- **The standard ATTA assessment included 4 norm-referenced DT traits:**
  - **Fluency**
    - **total number of relevant responses**
    - **Activity 1, 2, 3**
  - **Elaboration**
    - **amount of detail in the responses**
    - **Activity 2, 3**
  - **Flexibility**
    - **different categories of relevant responses**
    - **Activity 3**
  - **Originality**
    - **the statistical rarity of responses**
    - **Activity 1, 2, 3**

Bilinguals (Rus-Eng) and monolinguals (Eng)



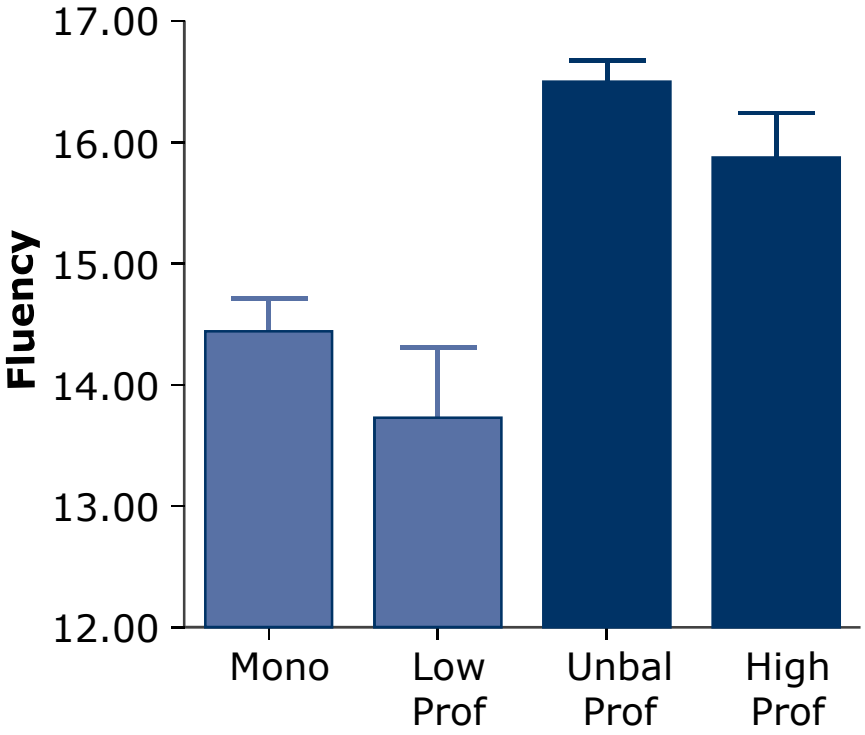


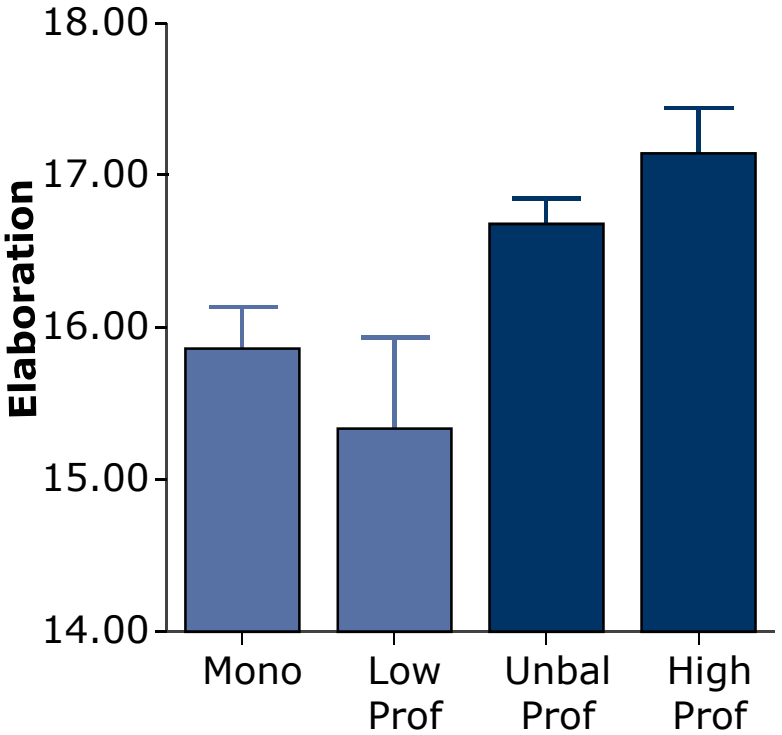


- **Bilinguals showed greater performance on fluency, flexibility, and elaboration in divergent thinking (Kharkhurin, 2007, 2008)**

Factors of Bilingual Development

- **Age of L2 acquisition influences fluency and flexibility**
- **The length of residence in a new country influences fluency, flexibility, and elaboration**
- **Language proficiency influences fluency and elaboration**





Generative and Innovative Capacities

- **SPSS FACTOR**
  - **Generative capacity (GC)**
    - **the ability to activate a multitude of unrelated concepts and work through the concepts already activated**
  - **Innovative capacity (IC)**
    - **the ability to produce innovative and useful ideas**

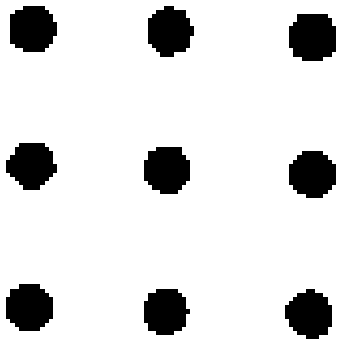
Conclusion

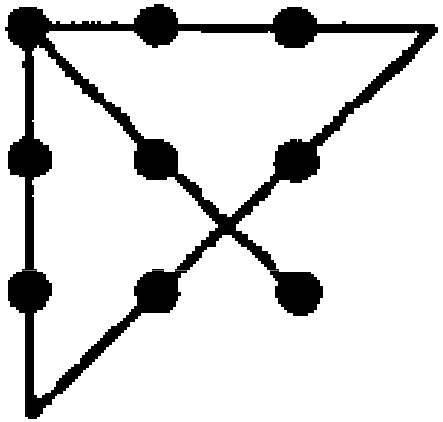
- **Bilingualism enhances generative, but not innovative capacity**
- **Bilingual ≠ Creative**

Non-Standard Thinking

- **If bilingualism facilitates generative capacity, i.e. more efficiently activates unrelated conceptual representations**
- **Then bilinguals should have greater ability to think beyond the standard category boundaries**

9 dots problem





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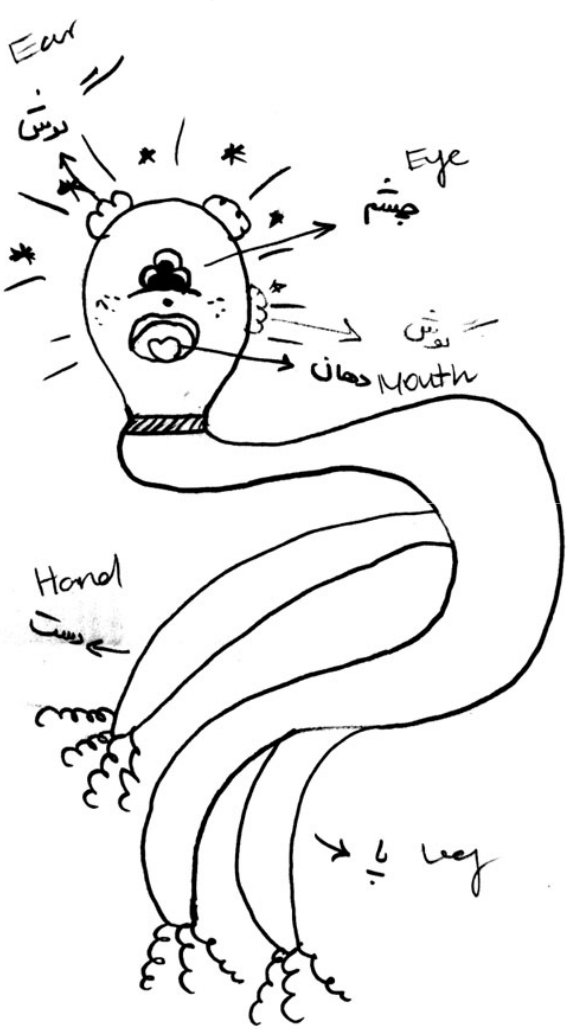
Draw an alien creature



Invariants

- **Symmetry**
- **2 eyes**
- **4 limbs**

Bilinguals (Farsi-Eng) and monolinguals (Farsi)

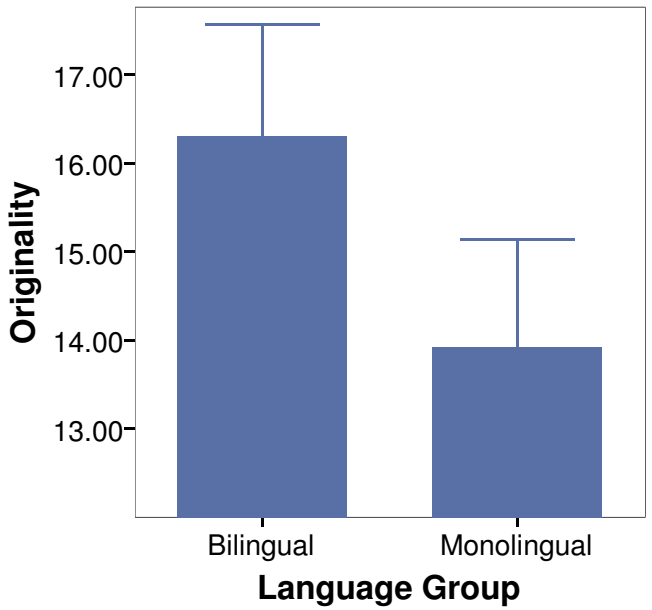
Invariants		Language group: biling	Language group: monoling
2 eyes	violated	54.3%	31.6%
	not violated	45.7%	68.4%
4 limbs	violated	62.9%	23.7%
	not violated	37.1%	76.3%

Bilinguals violated invariants more often than monolinguals (Kharkhurin, in press)

The effect of the bilingual developmental factors remains

Bilinguals (Farsi-Eng) and monolinguals (Farsi)

- **Bilinguals significantly outperformed monolinguals only on the innovative capacity**



- **Previous study**
  - **Only generative capacity**

Contradiction with previous study

USA sample

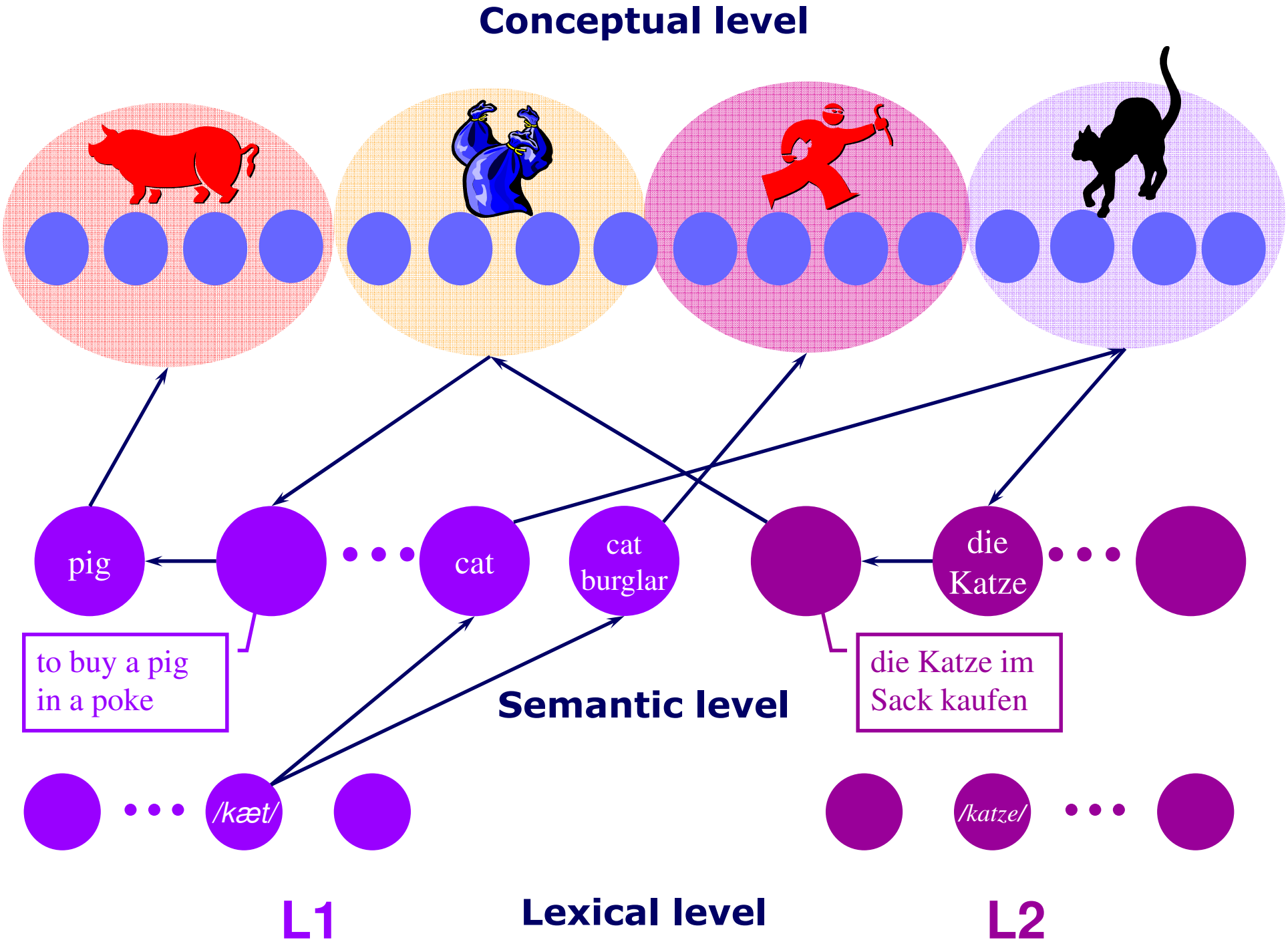
- **BI > MONO → GC**

IRAN sample

- **BI > MONO → IC**

Bilinguals' Generative Capacity

- **Generative capacity may result from unconscious processes**
  - **Language mediated concept activation mechanism (Kharkhurin, 2007)**
  - **Similar to Guilford's (1967) divergent thinking?**


Conceptual level
pig
cat
cat burglar
die Katze
to buy a pig in a poke
die Katze im Sack kaufen
Semantic level
/kæt/
/katze/
L1
Lexical level
L2

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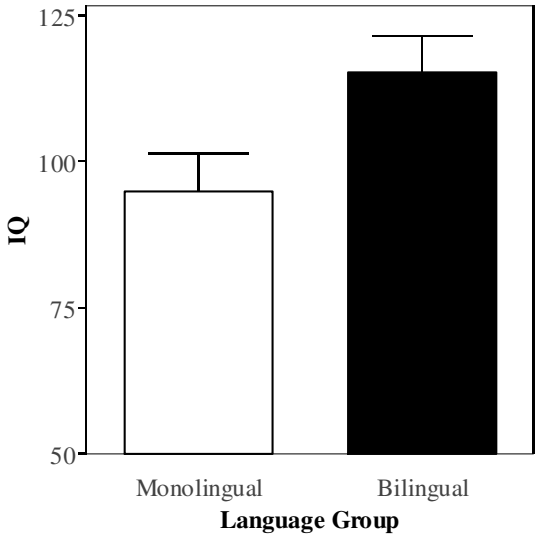
Bilinguals' Innovative Capacity

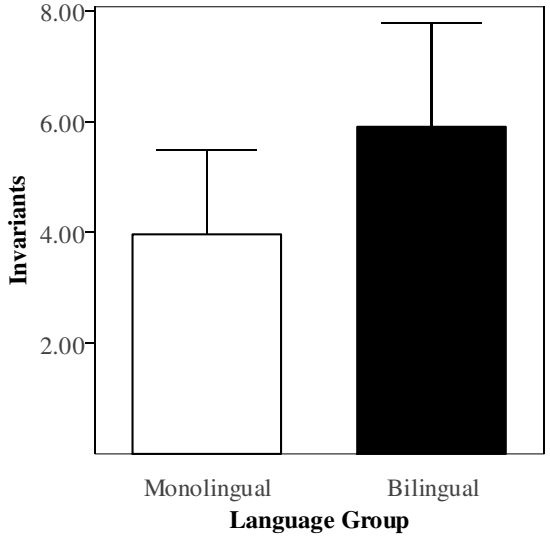
BI > MONO → IQ

$F(1, 69)=45.44, p<.001, \eta^2=.40$



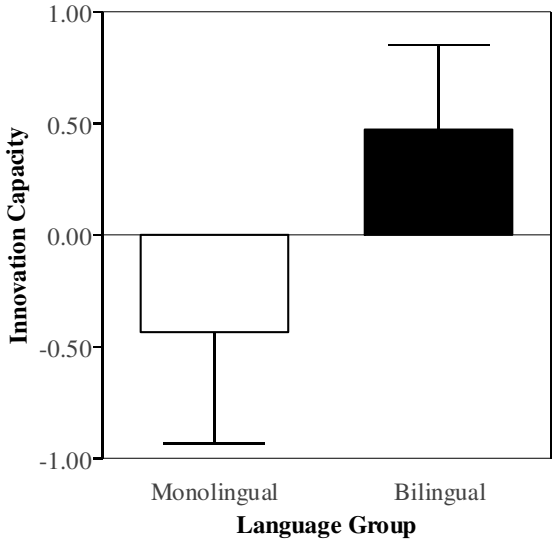
BI < MONO → Inv

$F(1, 69)=5.84, p=.02, \eta^2=.08$



BI > MONO → IC

$F(1, 69)=18.25, p<.001, \eta^2=.21$



Correlation

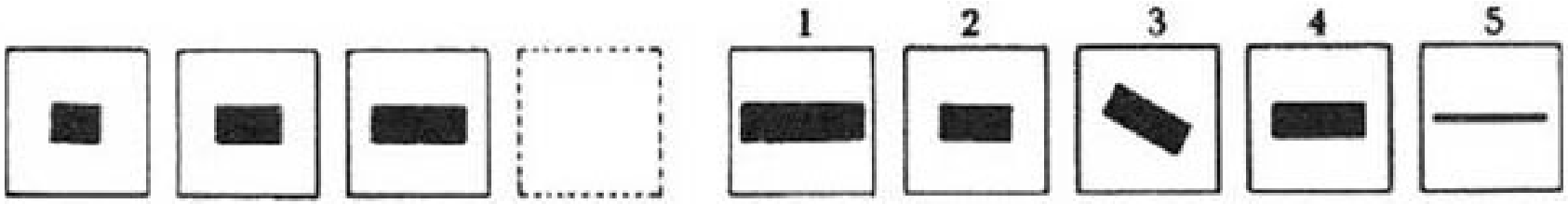
- **Inv~IQ** ($r=.32, p<.01$)
- **IC~IQ** ($r=.39, p<.01$)

Bilinguals' Innovative Capacity

- **Bilinguals > monolinguals**
  - **Invariant violation**
  - **IQ**
- **IQ correlates with invariant violation**
- **Both tests call for the activation of the same mechanisms**

Inhibition and Executive Control

- **CFIT**
  - **Identify common characteristics in the series**
  - **Find solution with the same characteristics**



- **IAC**
  - **Indentify common characteristics of the terrestrial creature**
  - **Produce solution with the opposite characteristics**

- **Bilinguals may benefit from inhibition and executive control (Bialystok, 2005)**

Bilinguals' Innovative Capacity

- **Innovative capacity may result from the conscious processes**
  - **Inhibition and executive control mechanism (Bialystok, 2005)**
  - **Similar to Guilford's (1967) convergent thinking?**

Conclusion

- **Bilinguals show greater performance on various creativity and intelligence tests**
- **Their creative cognition may benefit from more developed conscious and unconscious cognitive mechanisms**
- **Depending on circumstances, bilinguals may active different mechanisms that result in their greater generative and/or innovative capacities**
- **What circumstances?**
- **Cross-cultural differences**
  - **e.g., Kharkhurin & Samadpour Motalleebi, 2008; Niu & Sternberg, 2001**

Literature

- **Bialystok, E. (2005). Consequences of Bilingualism for Cognitive Development. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 417-432). New York: Oxford University Press.**
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