How to help children to prevent reading difficulties
..by learning to know who needs it and how to give it..
our solution: GraphoGame –
A learning environment for the acquisition of the basic reading skill for global use

如何帮助孩子克服阅读困难？
谁需要以及如何提供帮助？
——GraphoGame：一个全球适用的阅读技能学习平台

Heikki Lyytinen & GraphoGame teams

Please, have a look of the present slides (and some more) from info.graphogame.com

4th International Conf. on Poverty Reduction and Child Development, Beijing , October, 2015
Important facts about reading acquisition

阅读学习的重要事实

- Reading acquisition = learning to connect a spoken language to its written forms
- 阅读学习=学会口语和书面语之间的关联
- Written languages vary in terms of how this connection-building can be made
- 不同书写系统中的关联方式存在巨大差异
- Alphabetic orthographies such as Finnish, Spanish and most African languages are consistent at grapheme-phoneme level
- 拼音文字，例如芬兰语、西班牙语和大部分的非洲语言，字符-音位之间的关联非常一致
- In orthographies of Asian origin the number of to-be-stored connections is a great challenge
- 亚洲语言中所要记忆的关联数量非常巨大
Globally 780 000 000 people are illiterate.

全球七亿八千万人不会阅读

• Biologic, educational and social problems

生理、教育和社会原因
Compromised reading skill: a global view
危及阅读技能的因素：全球视角

Biological reasons 生理因素 (% of 1.-3. graders)
» Global （全球） > 5%
» Finland （芬兰） > 3% (and other transparent languages 其他透明语言)

Educational reasons 教育因素
» Global （全球） - up to 90% (in some developing countries 部分发展中国家)
» Finland （芬兰） - 0%
Early identification - Jyväskylä Longitudinal study of Dyslexia (JLD) & Graphogame – our tool for the prevention of reading difficulties

阅读困难儿童的早期鉴别——Jyväskylä阅读障碍追踪研究
Graphogame——阅读困难的干预工具

The Jyväskylä Longitudinal study of Dyslexia (JLD):
An intensive follow-up of children at familial risk for dyslexia from birth

> JLD 1994-

> Graphogame (Ekapeli in Finland, 2004-)
Learning game programmers: Iivo Kapanen, Ville Mönkkönen, Miika Pekkarinen

Supported by
EU, Niilo Mäki Foundation, Academy of Finland, Univ. of Jyväskylä, Tekes, RAY, Ministries of Education & Foreign Affairs Finland, Kela, Finnish Cultural Funds, Nokia Oy, Kone Oy, Wärtsilä Oy & Microsoft
IDENTIFYING & PREDICTING RISK
significant predictors found in the follow-up from birth of children at familial risk for dyslexia (Jyväskylä Longitudinal study of Dyslexia)

P = Predictors  预测指标
D = Differences between groups  组间差异

<table>
<thead>
<tr>
<th>Age</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 - yrs</td>
<td>Reading accuracy &amp; speed</td>
</tr>
<tr>
<td>5 - yrs</td>
<td>Naming speed</td>
</tr>
<tr>
<td>4 - 6 yrs</td>
<td>Phonological manipulation</td>
</tr>
<tr>
<td>5 - 6 yrs</td>
<td>Letter knowledge</td>
</tr>
<tr>
<td>5 - yrs</td>
<td>Verbal memory</td>
</tr>
<tr>
<td>3 - 6 yrs</td>
<td>Phonological sensitivity</td>
</tr>
<tr>
<td>3 - 5 yrs</td>
<td>Inflectional skills</td>
</tr>
<tr>
<td>2 - 3 yrs</td>
<td>Articulation accuracy</td>
</tr>
<tr>
<td>2 yrs</td>
<td>Maximum sentence length</td>
</tr>
<tr>
<td>6 mth</td>
<td>Speech perception</td>
</tr>
<tr>
<td>3-5 days</td>
<td>ERP to speech sound</td>
</tr>
</tbody>
</table>

Learning game supporting the acquisition of the basic reading skill: Graphogame helps learning the connections between spoken and written language.

学习游戏可促进基本阅读技能的获得：Graphogame可帮助孩子学习口语和书面语之间的关联

For a detailed description of the Graphogame, see Richardson & Lyytinen, 2014
Graphogame – an enjoyable mobile or computer game for learning to read: How it helps at risk children to overcome the fuzziness of the phonemic representations with letters

Description. In the game the learner is choosing from the falling balls the corresponding letter of the one s/he hears from headphones. The illustration shows an example of how results can be followed. Here we follow how /N/ sound (in the centre) which learner has heard in the game more than 100 trials at the moment this picture is printed from the game logs has made him/her to choose incorrect alternative letters (shown with the number of times these have occurred with the correct N-letter). The red distributions reveal that the learner has had difficulties in not to choose R and M during the first fourth of such trials, but became able to learn during the last fourth (with green distribution) that e.g. R does not represent the /N/ sound. For this learner acquiring that the /N/ sound is not represented by M-letter has been a real challenge as shown by the red and darker green distributions which reveal that most of the choices during the first and second fourths of trials (respectively) have ended up to this mistake. The learner has failed to learn to identify the correspondence of the /N/ sound during the whole session in trials where M has occurred (7 times) as an alternative. On the other hand s/he has not chosen e.g. S to represent the /N/ sound any more during the last fourth of the trials (no misidentifications during the 7 last of the 34 trials with S as an alternative). For more details, see Lyytinen et al., Scand.J.Psychol., 2009, 50, 668-675 and for documentation of the efficiency of the game in supporting learning among at risk children, see e.g. Saine et.al., Child Development, 82, 3, 1013-1028.
Exemplary learning curves of individual Finnish children at risk (N=726)
芬兰阅读困难高危儿童的典型学习曲线（N=726）

Hours of playing (游戏时间)

Modelling: Janne Kujala
RRI = Remedial teacher instructs children in a small group all the time.

CARRI = Remedial teacher accepts each child plays in turn during her remediation ~1/5 of the time.

1/5 干预时间用于玩游戏
GG training of <5 hours affects brain
5个小时的GG训练即可影响大脑

HL and UR in collaboration with Swiss colleagues Daniel Brandeis, Sylvia Brehm
与瑞典研究者Daniel Brandeis和Sylvia Brehm合作

Pre-Post GG: Children (n=15) before and after playing with Graphogame
后测-前测：15个孩子在参与游戏之前和之后的比较

Post-pre interaction between groups playing Graphogame vs Mathgame (same with numbers): \( p < 0.005 \)

Brem et al., PNAS, 2010, 107(17), 7939-7944.
Successful preventive practice
成功的预防实践

Practice effective when

* started at >6.5y of age  6.5岁之后才开始
  * played >1 x per day in subsequent days until the goal is reached
在通关之前每天至少玩一次
  － ”active” sounding of the targets make it more effective
  － 主动读出目标语音更有效
  － Learner gets ~80% correct (adapted on the basis of history)
  － 学习者达到80%以上的正确率
  － the role of parents: they show they very much like child plays GG
  － 父母：乐于让孩子玩GG游戏
Grapho Learning Initiative

Our vision: will help millions of learners, who otherwise would not have access to learn basic skills, such as reading, and be able to launch themselves to a sustainable learning curve and a road to prosperity.

我们的愿景：帮助成千上万的没有机会学习各种基本技能（例如阅读）的孩子，让他们走上可持续发展的学习之路，通向成功。
Low cost solution for developing countries

发展中国家的低价解决方案

• The GG works in low cost tablet and smart phone devices

• GG可在低价的PAD和智能手机上使用

• The mobile games are likely reaching the homes also in Africa within next not so many years.

• 即使在非洲，移动游戏也将很快进入家庭

• Ministries of Education: training, learning, analytics.

• 教育部门：训练、学习、分析

For learning the results of our GG-studies in Africa, (-2015), see Ojanen et al., 2015

**How Graphogame helps in Zambia**

**GG如何帮助赞比亚孩子学习阅读**

![Graph showing the effect of using a mobile literacy game to improve literacy levels](image-url)
Practical facts about the game
游戏的几个事实

• Very easy to use – children learn within minutes and can use without adults
  易用掌握——孩子很快学会使用，无需成人参与
  – 4-10 hours of playing helps most at risk for dyslexia
  – 4—10小时的参与即可帮助大部分阅读障碍高危儿童

• Works in Symbian & Android MS devices
  可在塞班和安卓设备中使用

• Used in Finland via a state procurement (made by the Ministry of Education - at best >20 000 daily users – from the age cohort of 60 000)
  通过政府（教育部）采购，在芬兰广泛使用（2万日常用户）
GraphoGame® as a Service

Learning

GraphoGame® as download and/or online
Online learning material, videos, ebooks and guides
Teacher training, Classroom and/or GraphoGame® Club support.

Analytics
Dynamic assessment, analysis and adaptation to learners skills.
Gamlogs Database Big Data

Training
The basic principles of Graphogame development for a new writing system

开发新语言版本Graphogame的基本原则

- Careful study of the written language environment with local experts for developing appropriate content
  - 本国专家细致研究书写系统并发展合适的内容

- Evidence based documentation of the efficiency of the game
  - 寻找研究证据证明游戏的有效性

- Distribution and use under the responsibility of the local Ministry of Education after research has shown its efficiency in an orthographic environment
  - 在研究已经显示其本土化改进的有效性之后，在本国教育部门监控下推广和使用
Global Network

全球网络
Research And Development Partners
GraphoWorld Network of Excellence
全球研发合作伙伴
For more.., please,
更多信息，请
• Call（致电）: +358 50 552 4892
• See for Unesco Chair（访问 Unesco Chair主页）: www.jyu.fi/unescochair
• Have a look of our research（访问我们的研究主页）: heikki.lyytinen.info
• Ask for reprint(s)（获得副本）: heikki.j.lyytinen@jyu.fi
• The game pages in Finnish（芬兰语游戏主页）: http://www.lukimat.fi/
• ..in English（英语游戏主页）: graphogame.info
• See for details（了解更多细节）: Human Technology, May 2014

• Thank you for attention! 感谢聆听！