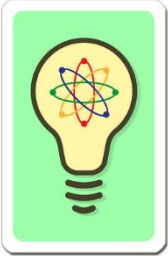
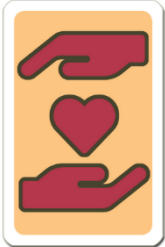


# Game of Invention

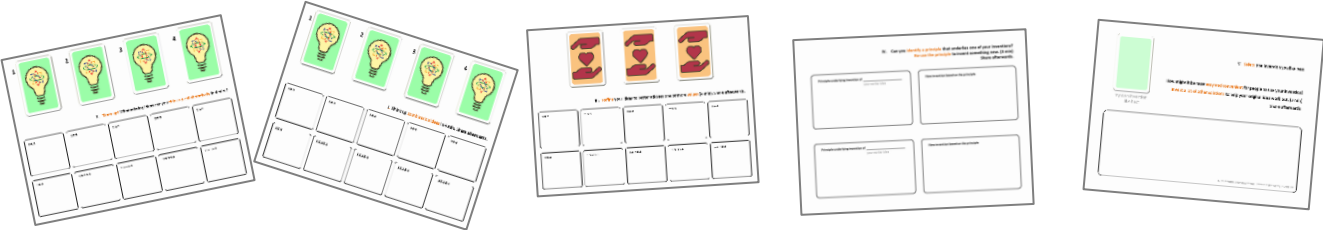
Tools included:



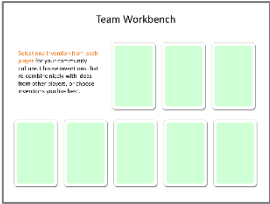
55 Basic Idea Cards



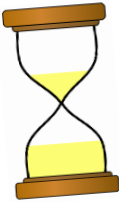
55 Value Cards



An Invention Workbench (5 sheets) for each player



A Team Workbench (1 sheet) for the group



Tools you need to add:

a timer

and



something to write

**The aim of the game is to have fun, to think up some really interesting ideas, and to develop your creative spirit.**

This game builds on an established model of invention, called the *Computational Process Model*. It is informed by research on creativity and innovation across human (pre-)history. The model distinguishes seven different avenues of invention, which you will try out in the game.

After each game round, a reflection input features some insights from innovation research and invites you to explore your related experiences during the game.

### **Number of players:**

It is best to play with 2-4 persons. You can also play the game alone. In that case, the game rounds II-Team-Up and 10-min-Team-Workbench are omitted, and you cannot win against others. It is also possible to play in a group with more than 4 persons. However, the game will last longer as all players share their ideas per game round.

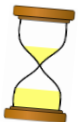
### **Preparation:**

Mix all cards with *Basic Ideas*. Mix all *Values Cards*.

Give each player their *Invention Workbench* (5 sheets of paper) and a pen or pencil.

Have a timer ready.

Determine one player who reads out the instruction and reflection input per game round.



While working on the *Invention Workbench*, each game round lasts **4 minutes**.

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### **I. Think up combination ideas. Share afterwards.**

Without looking into your hand, each player draws four *Basic Idea Cards*. Sort the cards onto your workbench. Only when the timer starts, turn the cards around and see what basic ideas you get.

Make new inventions by re-combining your basic ideas. For instance, when one of your given ideas is “agriculture” and another is “vehicle”, you can invent a vehicle for agriculture, such as a tractor. You can invent things that you already know – like a tractor. You can also think up new things.

Some cards with basic ideas show multiple options. In that case, pick what you want.

### **Reflection after sharing:**

Note how it is fairly easy to make new inventions simply by re-combining existing ideas. No matter what basic ideas you get, there is usually some way to recombine them and obtain new things.

The activity you just conducted corresponds to *Combination Inventions* in the *Computational Model*.

In terms of empirical data, whenever a basic idea is released in a community, new combinations based on it tend to follow in short order. However, complex combinations often require more time. How was your experience? Was it easier for you to combine two ideas or multiple ideas at once? Have you found new solutions that combine two, three or even four basic ideas?

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## **II. Team up! What missing ideas can you think up collaboratively?**

Pool your creative potential and develop solutions for some of the blank combination fields. If you have little time for the game, pick the sheet of one player and work on it jointly. When your agenda is more relaxed, devote team-time to the workbench of each player.

Endorse a “Yes-and” spirit. Build on each other’s ideas.

### **Reflection after sharing:**

In research, the number of persons in a community is a key predictor of innovation outcomes. The more persons get involved, the more inventions emerge. This line of research has been concerned a lot with community sizes and innovation outcomes over long time spans, such as hundreds or thousands of years.

However, one can make related observations concerning the impact of group size in the short run. It makes a difference whether you conduct a creative project alone, in a small or larger group. With more people involved, there is a potential of exploring more and more diverse ideas.

Were you able to arrive at new solutions by collaborating? If so, do you think you could have invented the same solutions by working alone? Or did the unique perspectives of your co-inventors co-shape the ideas that emerged?

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## **III. Refine your ideas to better address one or more values. Share afterwards.**

Without looking into your hand, each player draws three *Value Cards*. Sort the cards onto your workbench. Only when the timer starts, turn them around and see what values you get.

Refine one or more of your inventions, so as to better address one or more of your values. For instance, when you have the value “sustainability” and one of your inventions is a “tractor”, you can re-design the tractor to make it more sustainable. Your refined idea could be a “tractor that drives by solar energy”.

Some *Value Cards* show multiple options. In that case, pick what you want.

### **Reflection after sharing:**

Note how you can re-design inventions for different values. Each value provides a different direction for further developments.

In real life, refining inventions for some value is often labour-intensive. That is why inventions are typically only tailored to address a low number of values. As a product developer, no matter what

value you pick, note that there can be many alternative values that are also important, but currently neglected in your design.

The activity you just conducted corresponds to the use of *Invention Values* in the *Computational Model*.

In this game round, you drew three values from the stable at random. Were you surprised that it was easy or difficult to address the values you received? Why did you choose to design for a particular value? Because you personally found the value important? Or because the value seemed to match your inventions especially well?

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#### **IV. Can you identify a principle that underlies one of your inventions? Re-use the principle to invent something new. Share afterwards.**

In every basic idea or even combination inventions you can identify underlying principles, which can inspire completely novel solutions in other areas of life. For instance, an underlying principle in the “wheel” is that you have something spinning around an axis. This principle can be re-used to invent a “pulley” or a “windmill”.

There is not just one correct answer about underlying principles in an invention. You can find many different underlying principles for each invention, depending on your interests.

##### **Reflection:**

In terms of research, it seems to be a difficult or less likely activity for humans to search for underlying principles and use them as a basis for creations in novel domains. Respective creations often emerge hundreds or even thousands of years after the basic inventions that provided the principle. Note how both the pulley and the windmill were invented long after the wheel.

The activity in this game round corresponds to *Invention Exaptations* in the *Computational Model*.

How easy or difficult was it for you to find underlying principles and use them for novel developments? How many solutions did you find in this game round, compared to the number of solutions you produced in other rounds?

What do you think might be the merit of looking for underlying principles in creative projects?

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#### **V. Select one invention you like best. How might it be most easy and convenient for people to use your invention? Invent a lot of other solutions to help your original idea work out. Share afterwards.**

Often times, making an invention is not enough for people to make easy use of it. Other things need to change in the world for your tool to work properly. For instance, in order to benefit most from wheels, subsequent inventions such as streets, vehicle-repair-services or tire-shops helped a lot. You can also think of wild ideas such as a law: “People on wheels always have priority”.

How might it be most easy and convenient for people to use your selected invention? Think up a lot of helping solutions. Re-shape the world to match your creation!

**Reflection:**

The practicality of your invention depends a lot on the world around it. This “world around” is not necessarily static. It can be changed to facilitate the spread of your invention, but it can also be declared “unchangeable” and then the prospects for your invention may not seem good. Next to inventors, especially rich and powerful community members decide over the fate of inventions in this sense. When you invent the wheel, will the community be willing to build streets and develop traffic regulation?

Your activity during this game round corresponds to the development of *Invention Toolkits* in the *Computational Model*.

How was it for you to re-shape the world, paving the way for your favourite invention? Was it fun or scary, easy or difficult? How do you feel about the merits or dangers of reshaping the world in favour of specific inventions?



Dedicate 10 or more minutes to the *Team Workbench*.

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**Select one invention from each player for your community culture. Fill the whole workbench with the most promising ideas that have emerged during the game.**

Inventions make up our world and shape people’s life experiences. Almost everything that surrounds us is the result of someone’s creative projects, and of inventions people made before us. Not only the houses, computers, tables and books around us have been created by someone. Even the raw food that we eat – like apples and salad – is shaped and brought to us based on inventions such as agriculture, breeding techniques, tractors, supply chains, money, trade and the like.

Think as a team about the world you want to live in. Look at each player’s workbench and see what favourite idea you really want to include in your community culture.

Moreover, check if anyone has made a *Game-Changing Invention*. Game-changers increase the quantity and/or quality of creations to be expected in the community henceforth. In human history, examples of game-changers were the invention of writing, the printing press and the internet. All of them help to record and distribute ideas more easily, so that more people can build on things developed before. If someone had a game-changing idea in your team, add it to your *Team Workbench*. However, be strict in your assessment. Game-changing ideas are rare in human history.

In addition, you may want to choose ideas from different players that can easily be combined, so as to fuel further creative developments in your team culture.

## Reflection:

In terms of research insights, it is clear that novel inventions depend strongly on past inventions that are accessible to community members. Even creative masterminds do not invent things “out of the blue”, but based on tools already known in their culture. For instance, Albert Einstein made great inventions in physics by re-using a wealth of earlier creations, such as symbols, mathematics, writing and academic journals. Moreover, in his creative process he benefitted substantially from further inventions made before him, such as furniture, cooked food and medicine.

In this game, you drew at random some basic ideas and values. They made up the cultural repertoire from which you generated new solutions. Every child makes a similar experience: being born into a specific culture of tools and values, without having a choice about the culture to start with. How different were the solutions each player developed in your team, depending on the cultural material each person received at the outset? Beyond your original material, how did your personal values and preferences still shape the direction of your novel creations?

Another important research finding concerns intercultural exchange. When people learn about the cultural repertoire of other communities, this can provide a lot of inspiration for new developments in one’s own culture. How was your experience during the game? Did you obtain inspiration from the inventions others made on their workbenches? Did you feel inspired to combine your ideas?

Overall, how did you like your creative process alone and in the team? How do you like the ideas you came up with – is there something you want to follow up on in real life?

Hopefully you had fun creating new stuff! Maybe when you look around in the world you now have a sharpened eye for the invention processes underlying things around you. Does a product combine two or more basic ideas? Is a product refined to address a specific value? (Is the product maybe not designed to address some other important value?) How would you redesign or combine ideas around you? If you like to innovate, just keep going.

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## Who won?

You won the game when you came up with really interesting ideas, when you enjoyed the creative collaboration and gleaned some insights into creative processes. In the ideal case, your whole team wins together.

If you prefer a more competitive evaluation mode, you can determine a winner based on the scores below. Reveal the scores you assigned yourself to other players and take joint decisions in case of diverging views.

**Fluency:** Count the number of ideas that you generated by yourself (without collaboration) on each workbench. Every idea is worth one point.

**Collaboration:** Count the number of ideas that you generated actively together with others. Each of your joint ideas is worth one point.

**Novelty:** Assign yourself one point for each of your inventions that did not exist prior to playing the game – something you thought up instead of listing what already exists in the real world.

**Effectiveness:** Considering only your novel ideas, how effective is each? Ideas that are just silly score zero points. An idea that would help regarding the purpose for which the solution is intended is worth one point. Ingenious inventions score two points. These are ideas that seem really good; solutions you want to follow up on even after the game. Moreover, all of your ideas that made it onto the team workbench count as ingenious inventions.

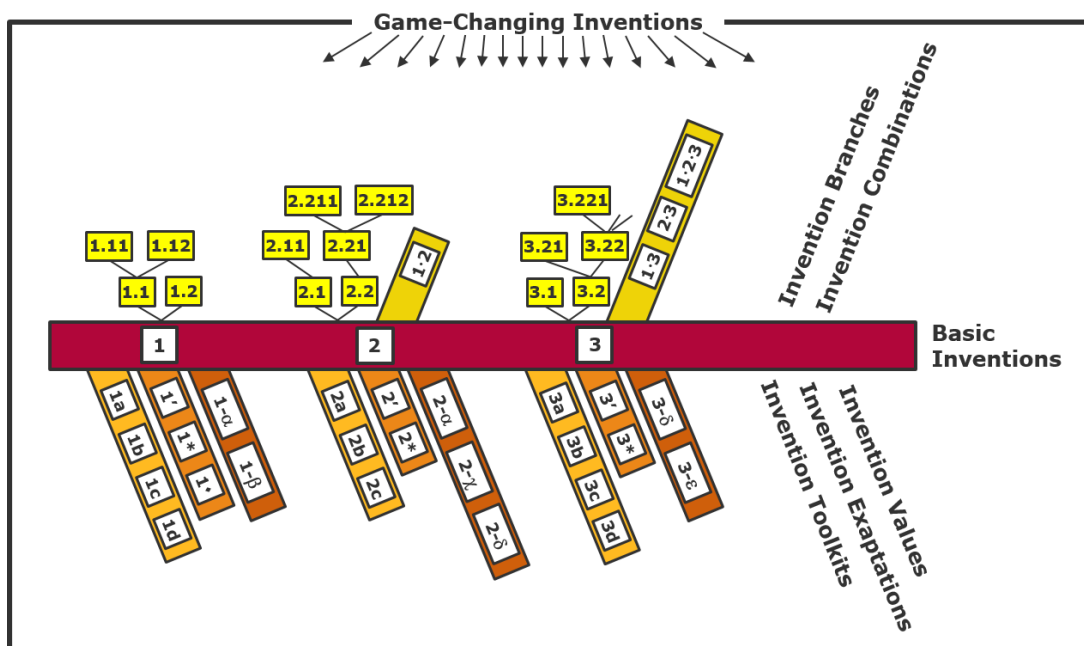
**Game-Changers:** Add five points for each original idea that is a game-changer. These inventions help the whole community innovate in higher quantity and/or quality henceforth. Be strict. It is seldom the case that someone has a game-changing idea.

**Audience Recognition:** You have 10 points to acknowledge great ideas from others. Determine two inventions made by other players that you like best and reward each with five points. You can also distribute your ten points unevenly if you have strong preferences for one favourite invention made by someone else.

Sum up all your idea scores and find out who wins this time.

**Background:**

This is the *Computational Process Model* that informs the game.



You can read more about the model in:

Corazza, G. E. & von Thienen, J. P. A. (2021). Invention. In V. P. Glăveanu (ed.), *The Palgrave Encyclopedia of the Possible*. Cham: Palgrave Macmillan.

von Thienen, J. P. A., Kolodny, O. & Meinel, C. (2022). Neurodesign: The biology, psychology and engineering of creative thinking and innovation. In N. Rezaei (ed.), *Thinking: Bioengineering of Science and Art*. Springer Nature.

The main structure of the model was developed by:

Kolodny, O., Creanza, N., & Feldman, M. W. (2015). Evolution in leaps: The punctuated accumulation and loss of cultural innovations. *Proceedings of the National Academy of Sciences*, *112*(49), E6762-E6769.

The model has also been advanced and tested in further directions, as by:

Kolodny, O., Creanza, N., & Feldman, M. W. (2016). Game-changing innovations: How culture can change the parameters of its own evolution and induce abrupt cultural shifts. *PLoS computational biology*, *12*(12), 1005302.

Creanza, N., Kolodny, O., & Feldman, M. W. (2017). Greater than the sum of its parts? Modelling population contact and interaction of cultural repertoires. *Journal of The Royal Society Interface*, *14*(130), 20170171.