

Games xPalαιοFaliro

Citizen Science for Collective Action



Games xPalaioFaliro is a **citizen science project** that engages the citizens of Palaio Faliro in a collective action. It aims to provide the starting point for a discussion of concrete proposals to promote environmental awareness and activism in a **participatory way**.

As a result of a **co-creation process**, the students of the 4th High School of Palaio Faliro challenged their community with the following dilemma: **How can people be more motivated about pollution?**

During a **collective experiment** on April, 28th of 2018, **149 participants** walking down the coast of Palaio Faliro volunteered to **play games** and to **answer questions** posed by the students in their public space.

The results of the **games** suggests that those with **fewest resources** might be **more vulnerable** to being exploited in the **collective effort** required for the maintenance of public spaces.

From the **survey**, most participants also expressed **their willingness to volunteer in coastal clean-up activities**. However, despite the concerns about environmental issues in general, and about the pollution of the coast of Palaio Faliro in particular, **the large majority had never participated in any kind of environmental action**.

While emphasizing the crucial **importance of environmental awareness and education** for responsible sustainable behavior - being the students the natural actors of change- we also stress the need to **promote a shift towards more concrete expressions of environmentally-friendly practices** in the form of, by way of example, community (i.e. schools or any self-organized concerned community) actions.

Recommendations

How can people be more motivated about pollution?

1. Create opportunities for the local community to replicate initiatives such as the one presented here to open up the debate about environmental awareness and action.
2. Ensure that community initiatives are equitable and in line with individual ability to contribute.
3. Reinforce the participation of local, middle-income, young, adults, and women, in the implementation of community initiatives to address the pollution of the coast .
4. Incorporate elderly people into targeted actions to create a more inclusive public space while raising environmental awareness.
5. Communicate and disseminate the results to stimulate an open and collective discussion, and to elicit a process of self-reflection about the compromise between individual access to the coast of Palaio Faliro, and its environmental sustainability .

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Introduction

Games X Palaio Faliro is both a game and a scientific research project that analyzes citizens' concerns regarding the pollution of the coast of Palaio Faliro in a participatory way. The research has been developed within the STEMForYouth project¹ which proposes new ideas, tools and ways of learning to stimulate young people's interest in science and technology.

The **students** of the **4th High School of Palaio Faliro** have acquired an active role in the definition of the research, in the collection of the data, and in the actions taken on the evidences gathered.

The preparation and realization of a **collective experiment** has tested the ability of an educational institution such as the 4th High School of Palaio Faliro to inspire community action. By means of **citizen science practices** we transformed the municipality of Palaio Faliro into a space for participation and inclusive social innovation based on sound scientific evidence with and for the citizens.

1. EU Horizon2020 Program

Citizen Science

Citizen science is a model of **participatory research** which stresses the involvement of the general public in the scientific research process. Its creative and innovative research methodology has gained increased recognition and popularity within the academic arena in the last decades, while transforming the way of doing research.

Citizens' engagement in scientific projects can be understood in terms of:

Contribution: At this level, participants contribute to the collection of the data; occasionally, citizens might help to analyze and disseminate the final results.

Collaboration: Here, participants take an active role in the data analysis phase. At times, they participate in the study design, data interpretation, conclusion formulation or results dissemination.

Co-creation: In its ideal level of engagement, citizen science involves the participants throughout all phases of the research process: from the definition of the research question, to the formulation of testable hypothesis, to the discussion of the final results, and by posing and answering new scientific questions.

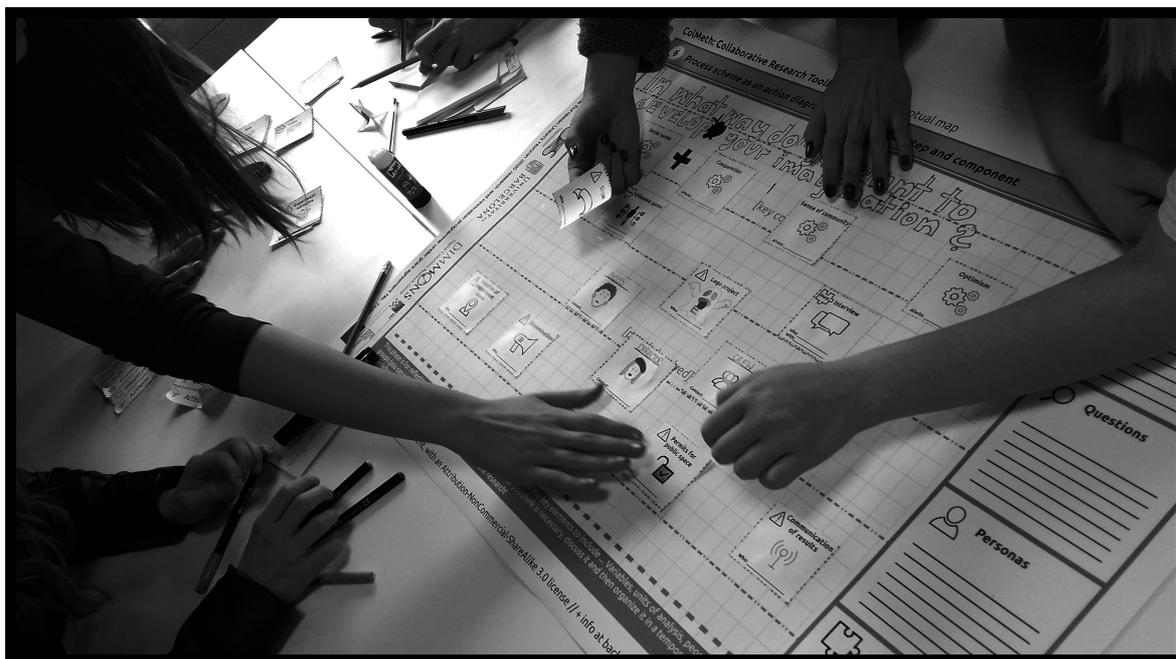
While the most widespread model of citizen science tends to consider forms of collaboration between scientists and citizens merely as "systems of contribution", there is a growing tendency to encourage a **closer involvement of the citizens** at multiple stages of the research process.

Co-creation

We raised, shared and collectively discussed our concerns regarding our immediate social environment.

The concerns of the **students** of the **4th High School of Palaio Faliro** were placed as the central axis of the whole project. A 4-step participatory co-design process shaped the definition of the collective experiment:

- Identification of a community concern
- Formulation of the research question
- Conceptualization of the experiment
- Organization of the experiment and logistics



How can people be more motivated about pollution?

Collective experiment

We asked the citizens walking down the coast of Palaio Faliro to interact with each other through a game run on digital tablets.

We have explored the behavior of the citizens of Palaio Faliro walking down the coast during a **participatory collective experiment** run on the 28th of April, 2018.

We brought the laboratory to the **public space**.

- Convergence of heterogeneous interests
- Sharing uncertainty
- Generation of multiple knowledges

The experimental device simulated **strategic social interactions** based on game theory with electronic tablets.

The participants were faced with the **dilemma** raised by the students, and were invited to get engaged.



How to play

The players had to decide how much to contribute to a common fund in a situation of conflict between individual and collective interests.

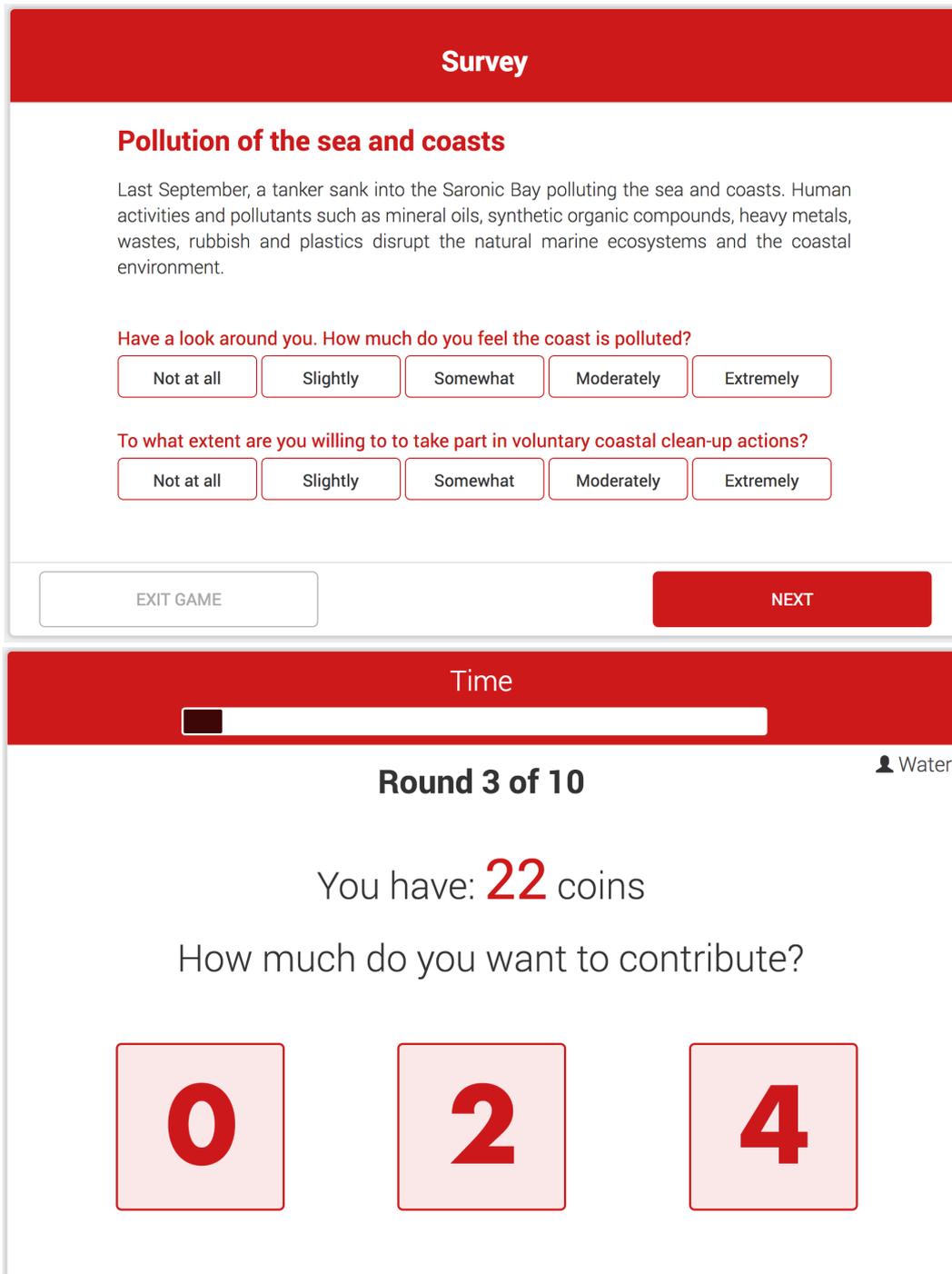
The participants played in group of **6 players**. They were given differential amounts of virtual money and asked how much they were willing to contribute, over ten rounds, to a common fund.

The **common objective** was to reach a certain threshold of minimum contributions (i.e. 120 virtual money, among all 6 players) which would grant support to the collective action (i.e. cleaning of the beach of Palaio Faliro) promoted by the students of the 4th High School of Palaio Faliro. However, each player had interests in keeping some or all the virtual money for herself, which increased her likelihood of **winning a price**.

The game used the language of **social dilemmas** to address the tension between individual and collective interest in the management of a natural shared resource. Natural shared resources are accessible to everybody who can benefit from it, regardless of how much they contribute to its management. Yet, nobody has a private incentive to contribute but exploit the benevolence of others. However, if anybody contributes the the common natural resource could be depleted or even destroyed, to the detriment of all.²



2. The tragedy of the commons (Hardin, 1968).



Experimental platform. Experimental platform implemented ad hoc to study the social concerns raised during the co-creation sessions. These screenshots represent the survey questions about pollution of the sea (top) and the contributions during the public goods game (bottom).

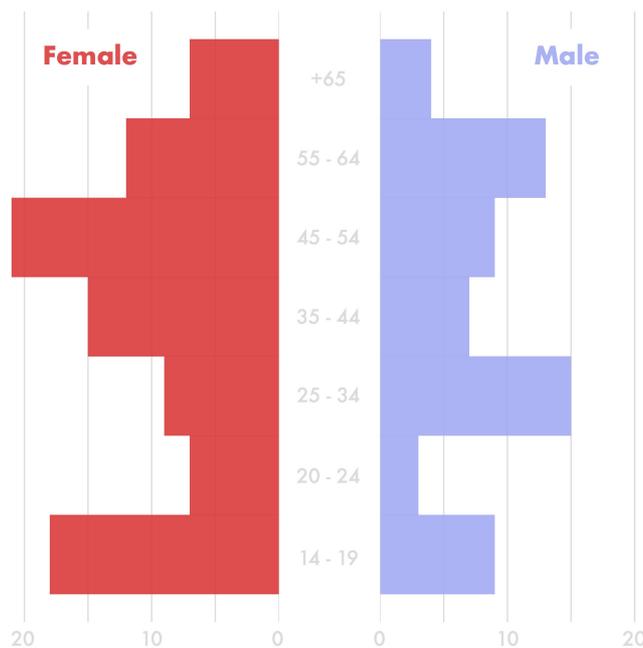
The participants

participants

156

valid participants

149

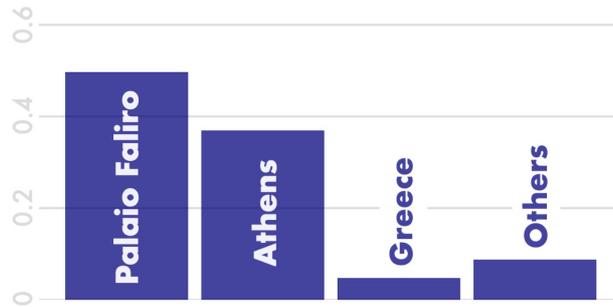


Demographics. More women (60%) than men (40%) who were walking down the coast of Palaio Faliro participated to participate in the collective experiment. The large majority of participants were adults (68%, 25-64 years) or young participants (25%, 14-24 years). Only 7% participants had more than 65 years old.

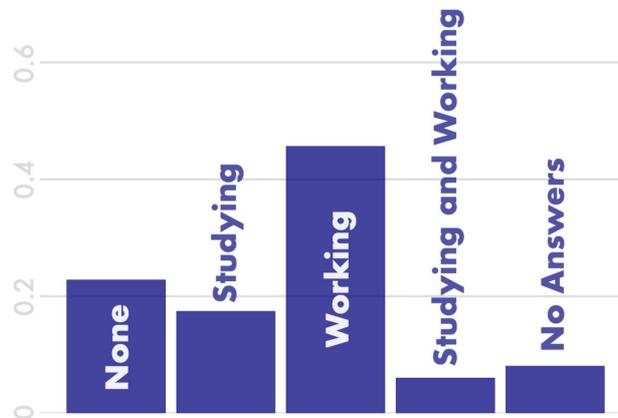


Participants profile

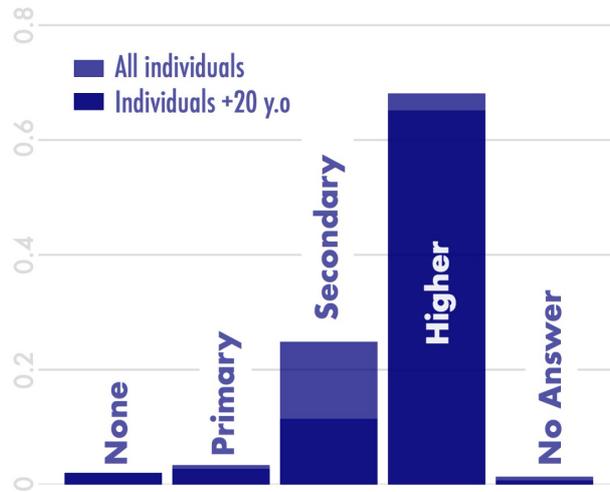
The coast of Palaio Faliro seems to be mainly accessed by middle-income adult residents, employed, with a higher educational level.



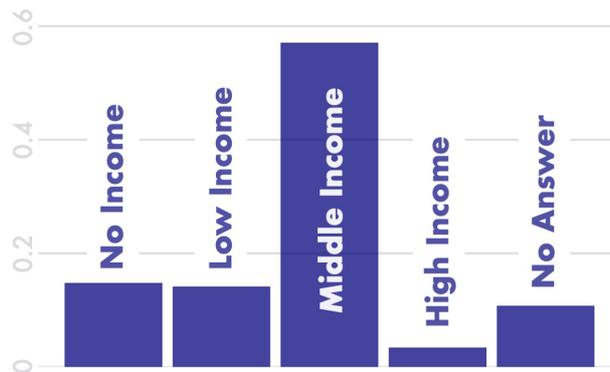
Residence. Half of the participants were from Palaio Faliro (50%), the rest coming from Athens (37%) or outside (13%).



Labor market participation. Most participants were active in the labour market at the time of the experiment (46%), while 23% being unemployed. More women (26%) than men (18%) were not working nor studying.



Education. The large majority (80%) of participants over 19 years old had a higher education. Yet, slightly more men (86%) than women (75%) had superior studies.



Economic status. More than half participants (57%) rated themselves as belonging to the middle income socioeconomic group.

The games

sessions

27

valid sessions

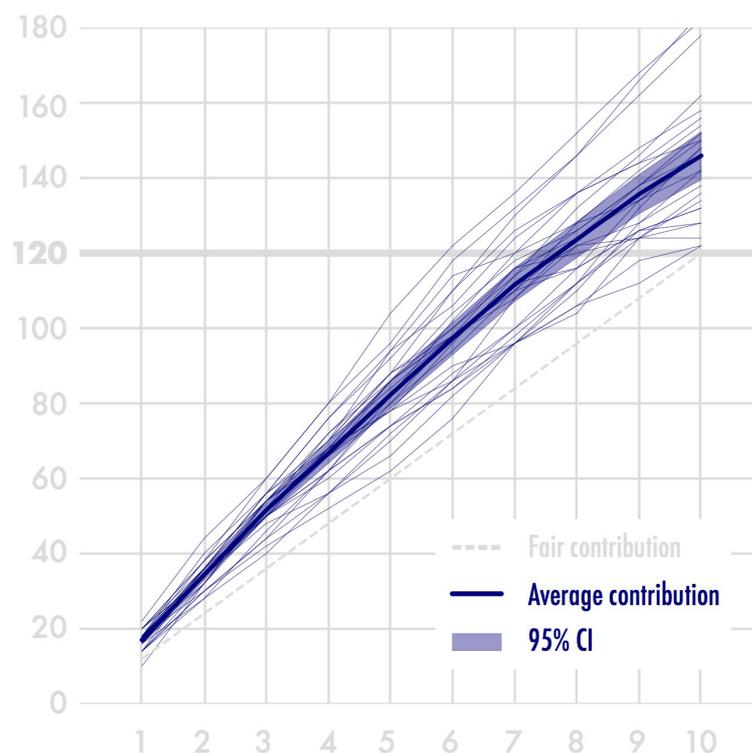
26

decisions

1620

valid decisions

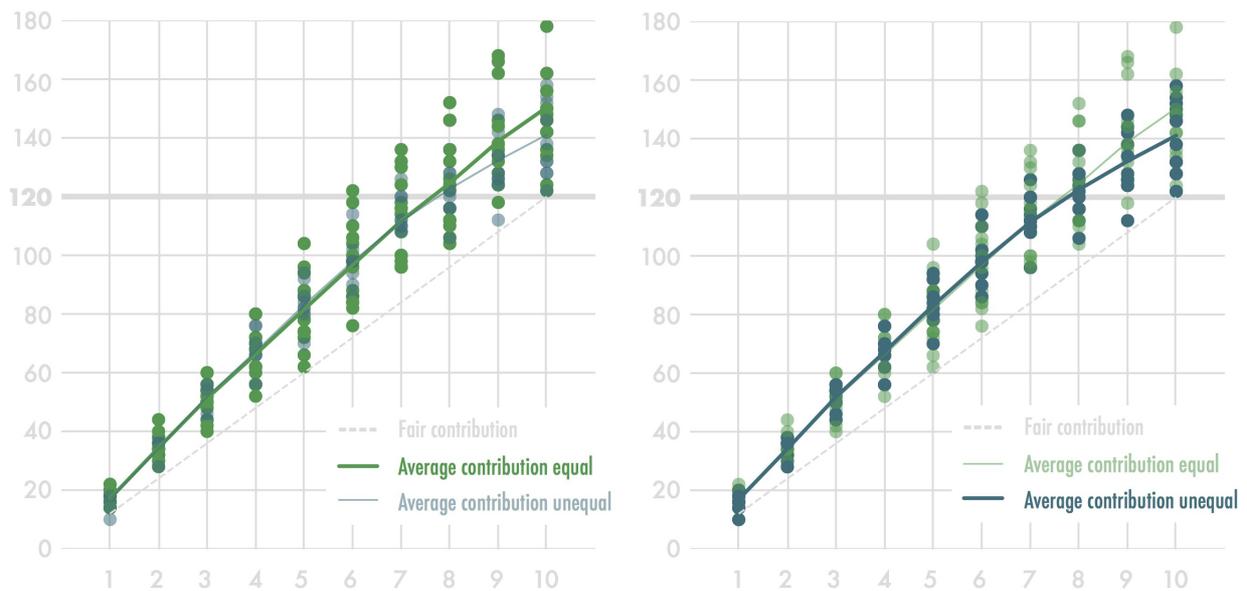
1477



Evolution of the games. All groups successfully reached the common goal, collecting on average 145.93 ± 1.98 MUs³ over ten rounds, which is more than the minimum amount required (120 MUs) to promote the collective action. Yet, groups differ in the amount of virtual money they contributed to the common fund: while some groups collected a total of 122 MUs, some others committed with 184 MUs of contributions at the end of the game. than 65 years old.

Playing with inequalities

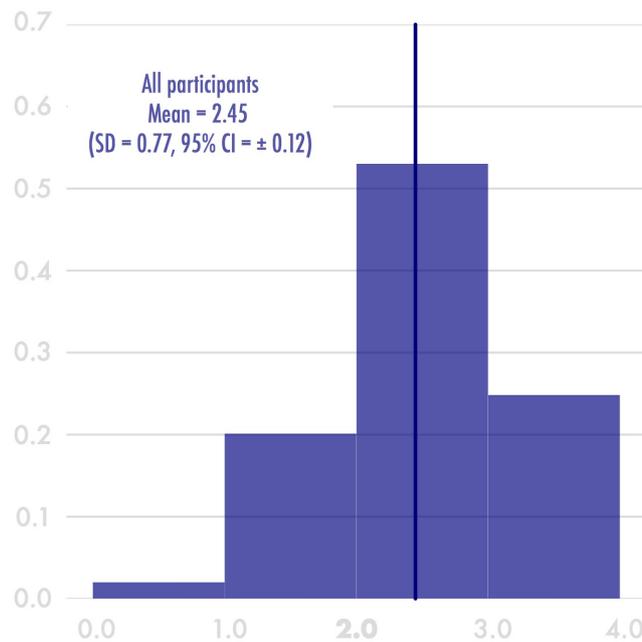
Groups with an unequal distribution of wealth among players collected less than groups where all players were endowed with the same amount of virtual money.



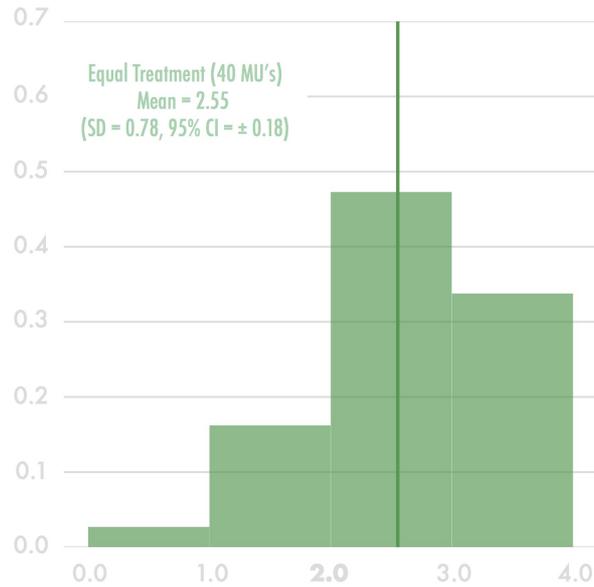
Evolution of the games with equal (left) and unequal (right) money distribution. The distribution of virtual money among players was not the same in all groups. In some groups (unequal groups) participants received different amounts of virtual money at the beginning of each game: poor players received 30 MUs, rich players received 60 MUs. In other groups (equal groups) all participants were endowed with the same amount of virtual money (40 MUs). Differences in the distribution of initial endowments between groups might partly explain why groups with no inequalities between players collected more, on average (150.43 ± 3.20 MUs), than groups where inequalities between poor and rich players were evident (141.08 ± 1.93 MUs).

Who contributed what?

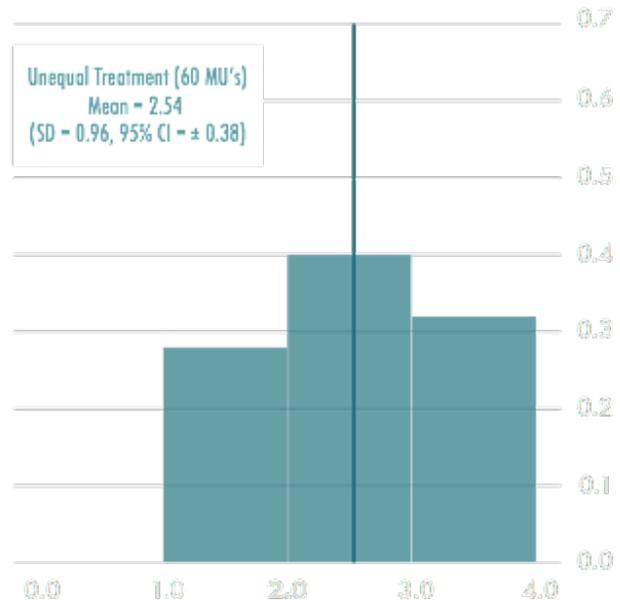
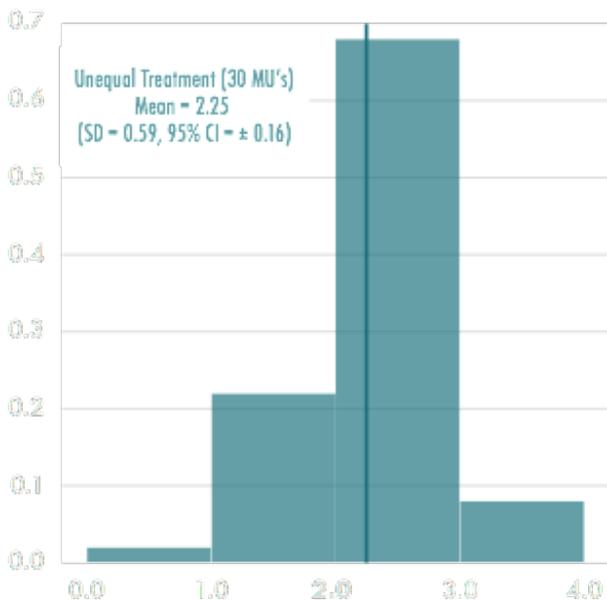
Poor players contributed the most to the common fund to support the collective action promoted by the students, while rich players in the game contributed the least.



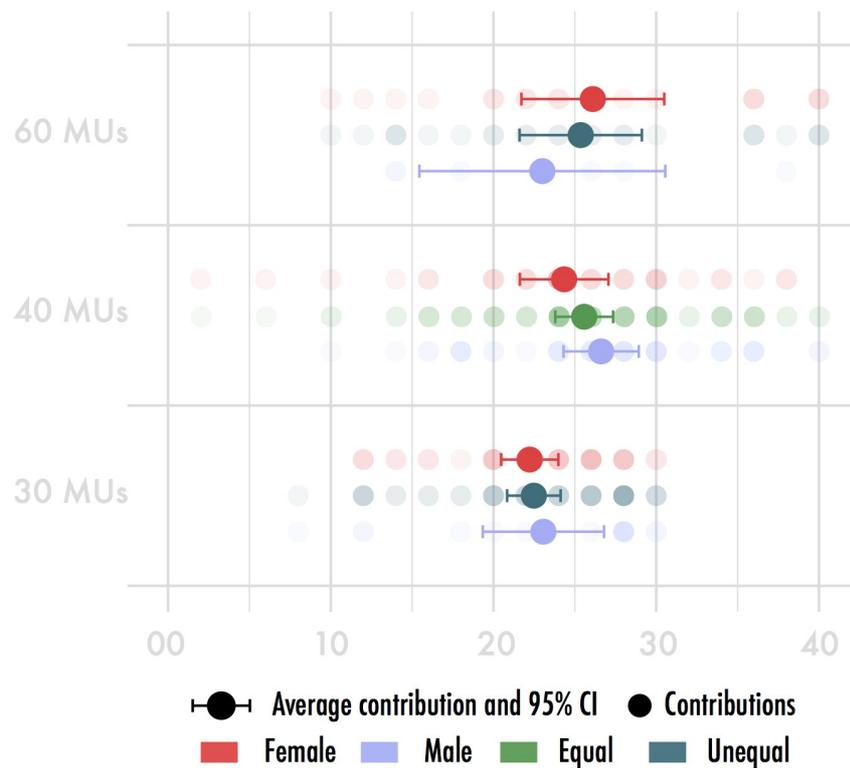
Individual contributions. Overall, each participant contributed, on average, with 2.45 MUs to the common fund to help support the cleaning of the beach promoted by the students of the 4th High School of Palaio Faliro.



Individual contributions of players endowed with equal amounts of money. Within groups with no wealth inequalities, each player (who received 40 MUs at the beginning of the game) committed with 2.55 virtual money (64% of her capital). These groups were composed by more men (53%) than women (47%), either from Athens (41%) or Palaio Faliro (41%).

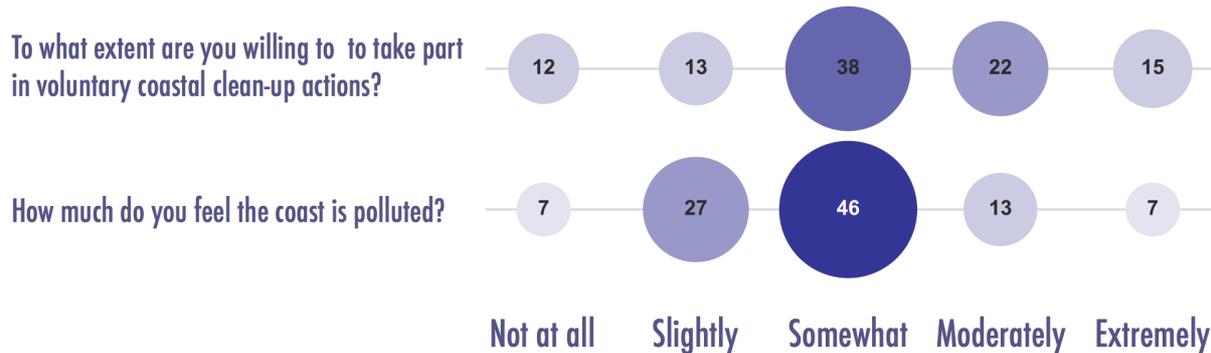


Individual contributions of rich and poor players. Poor individuals, who were endowed with 30 MUs, devoted significantly more money (75% of their capital) to the common fund, compared to rich players, who were endowed with 60 MUs and committed with only 42% of their initial capital. The majority of poor and rich players were adult (64% and 68%, respectively), women (70% and 76%), from Palaio Faliro (56% and 64%) and highly educated (64% and 76%).

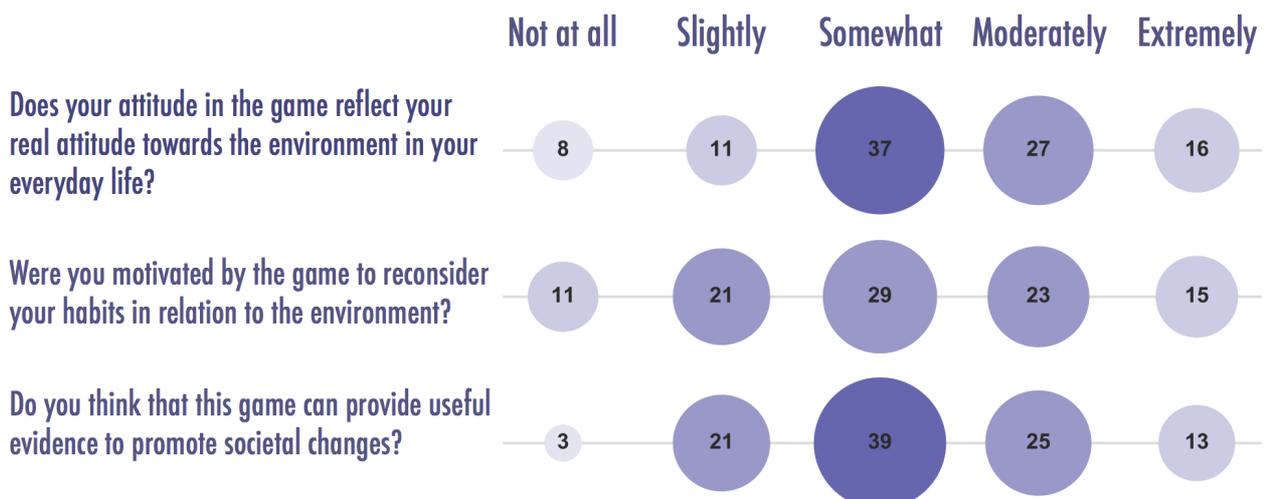


Individual contributions by wealth and gender. Female participants contributed slightly more than male when they were wealthy (60 MUs), in this case males (n=6) contributed 23.00MUs and females (n=19) 26.10MUs. In the other treatments males contributed more than females, when they have few resources (30MUs), females (n=35) contributed 22.23 whereas males (n=15) contributed 23.07MUs. Similarly in the situation in which all participants played with the same endowment (40MUs), females (n=35) contributed 24.34 MUs and males (n=39) 26.61MUs.

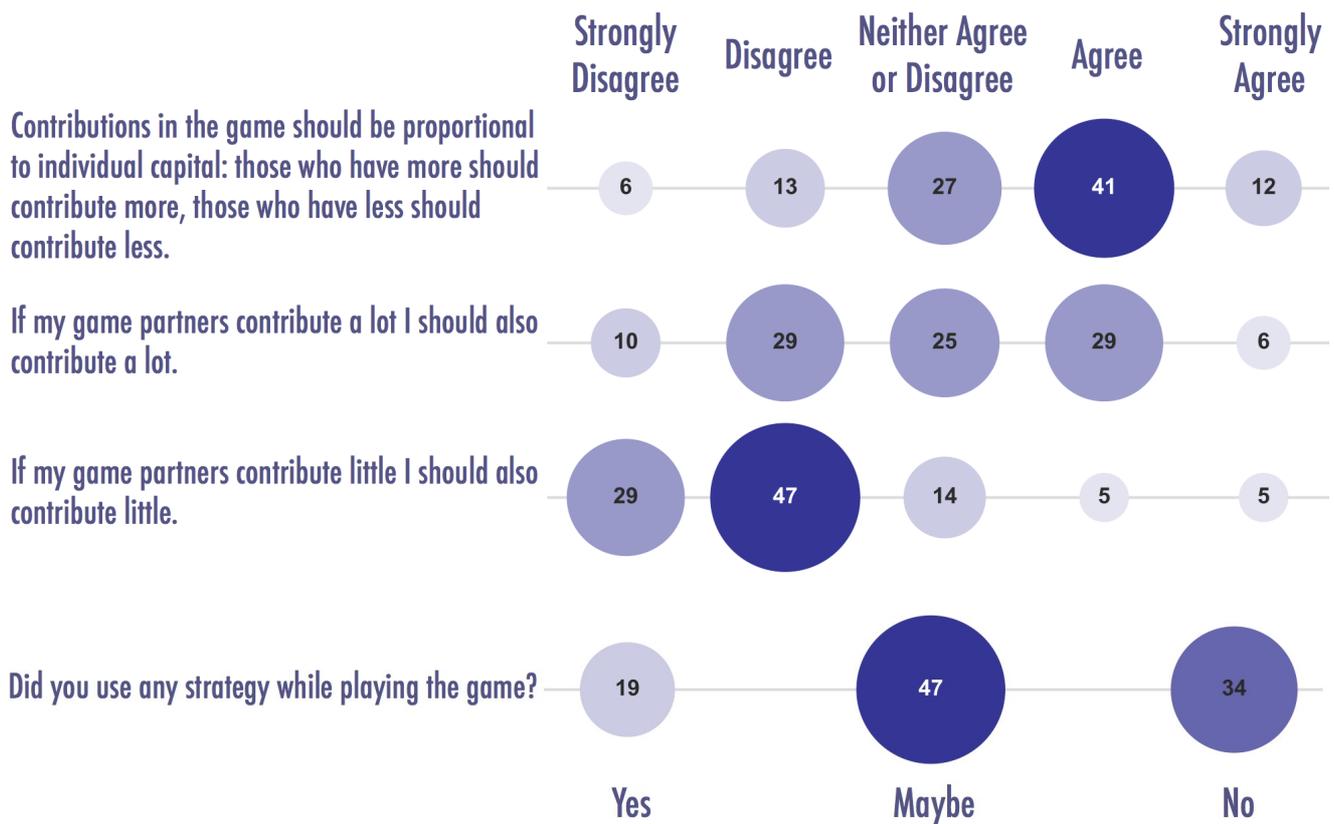
Environmental awareness and responsibility



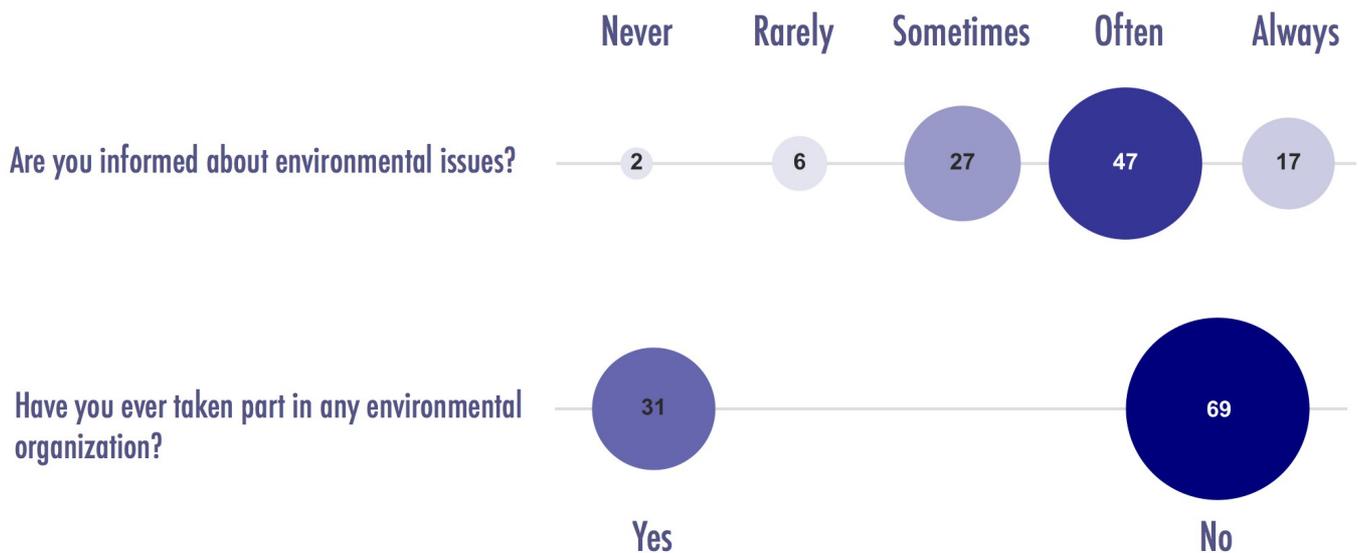
Environmental concern. Overall, 46% participants rated the coast of Palaio Faliro as somewhat polluted. Among those who perceived the coast from not at all to slightly polluted the majority (57%) were not from Palaio Faliro. The higher the educational level attained, the more concerned were the participants. Also, more than one third (37%) participants were moderately to extremely willing to take part in a collective action to promote the cleaning of the beach, prior to playing the game.



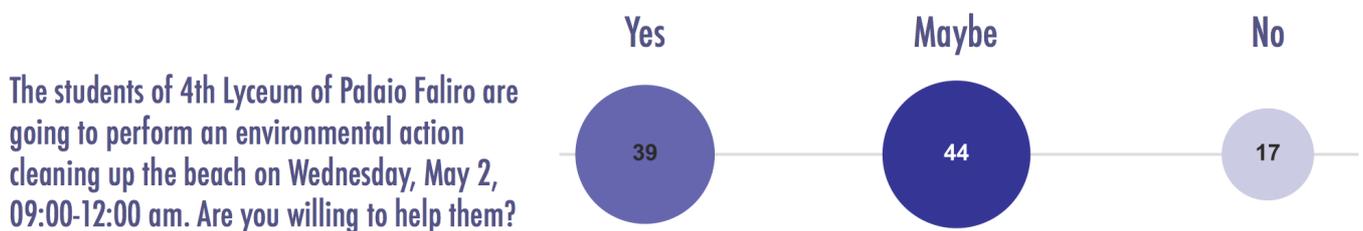
Attitudes towards the environment. The majority of participants' behaviors in the games reflected their everyday's behavior. Yet, up to 33% participants declared themselves as to be little to not at all motivated to reconsider their environmental habits.



Individual strategies for collective action. Slightly more than one third of the players (34%) did not use any particular strategy during the game. While their contributions seem not to depend on game partners' contributions, more than half participants (53%) either believe or strongly believe that individual contributions should be proportional to individual capital, the majority of whom (58%) being members of the community of Palaio Faliro.



Knowledge and involvement in environmental activism. Most participants (47%) are often informed about environmental issues, though only 17% of them belongs to the 14-24 age group. Yet, 70% of them never engaged in any form of environmental activism.



Environmental action. When asked, by the end of the game, about their willingness to participate in a collective action, 39% committed to help the students to clean the beach of Palaio Faliro.

Conclusions

Games xPalaiioFaliro addressed citizens concerns regarding the **pollution of the coast of Palaio Faliro** in a participatory way. As a result of the co-creation process, the students of the 4th High School of Palaio Faliro challenged their community with the following dilemma: How can people be more motivated about pollution?

During a collective experiment, 149 participants walking down the coast of Palaio Faliro volunteered to play games and to answer the questions posed by the students in their public space. The participants' profile provides cues about the **public life** along the coast, which is visited mostly by local community members and, to a lesser extent, by people from the entire city. The promenade of Palaio Faliro supports gender diversity while attracting mainly middle-income users. Seniors were significantly under-represented among the pedestrians taking a stroll by the seaside.

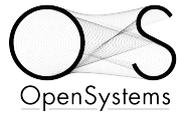
With regards to the game, all teams successfully reached the common goal, collecting on average more than the minimum amount of virtual money required to support the collective action promoted by the students. Yet, the fact that the equitable distribution of initial capital within groups led to higher contributions to the common, raises an interesting debate about whether **unequal resources allocations** among neighbors might impede the development of various kinds of social capital, cooperation, trust and support, necessary for collective action.

Indeed, within groups with economic inequalities among players, the poorest contributed the most. This suggests that those with fewest resources might be more vulnerable to being exploited in the collective effort required for the **maintenance of public spaces**, at the unfair advantage of those who own more. From the survey, fairness measurements suggest that most participants advocate for the need of contributions be proportional to individual ability to contribute.

Most participants expressed their willingness to volunteer in coastal clean-up activities. However, despite the concerns about environmental issues in general, and about the pollution of the coast of Palaio Faliro in particular, the large majority had never participated in any kind of **environmental action**. This points directly to the

research question raised by the students which has motivated the collective action.

While emphasizing the crucial importance of environmental awareness and education for responsible sustainable behavior - being the students the natural actors of change- we also stress the need to promote a shift towards more concrete expressions of environmentally-friendly practices in the form of, by way of example, **community** (i.e. schools or any self-organized concerned community) **actions**.



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