

**Students' Conceptions of Work and the Understanding of the Economic Value of Labor:
A Developmental Study of Unemployment and Job Precarity in Times of an Economic
Crisis.**

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Abstract

In the aftermath of the financial and economic recession of 2008, 130 Spanish students of five age groups (8 to 17 years) and two socioeconomic backgrounds were individually interviewed about unemployment and lower wages. The participants were presented with two hypothetical situations, and their responses were qualitatively and quantitatively analyzed. The results indicated that children bring their conceptions of work when attempting to explain those phenomena. Specifically, it was found that the explanations were closely associated with the comprehension of the notion of surplus value (i.e., the idea that workers create more value than the cost of their salaries), and that the development of this notion proceeds in three levels. Younger children were simply unaware of the capacity of workers to create value (Level 1), which gave rise to some alternative conceptions (e.g., the idea that money for salaries comes from external sources). The children within the age range of 12-13 began to understand that workers create some value (Level 2). At this level, however, the notion of surplus value was not fully understood, and the idea that money for salaries comes from external sources persisted in a variety of ways. From the ages of 13-14, the children begin to understand that a wage is the price of labor and that the employer earns a profit because workers create more value than the cost of their wages (Level 3). The article presents a discussion of the possible reasons behind the slow progress observed and highlights some suggestions for educational practice.

Keywords: economic crisis, unemployment, alternative conceptions, surplus value, economic education

The fall in employment and wages are the most severe consequences of an economic crisis. Spain was among the first countries to be impacted by the 2008 economic crisis as the real estate boom came to an end. In the aftermath of that crisis, millions of workers were laid off, and many others experienced pay cuts. At the beginning of the crisis, the loss of employment was concentrated in the construction sector, while at the second stage, which corresponds with the period in which we interviewed children, unemployment reached historic levels, and precarious employment was the “normal” form through which one could have access to work.

The research presented here aims to contribute to our understanding of the development of children’s knowledge about work and the learning of economics. Specifically, this study focuses on the students’ ideas about unemployment and job precarity in the context of the 2008 crisis and examines how they apply what they know to explain real-world situations. As Limon and Carretero (1997) pointed out, “often scientists use anomalous data to develop new interpretations that lead to new conceptualizations and finally, to a deep conceptual change”. Based on this reasoning, we believe that a study exploring how children respond to anomalous economic conditions could give us some clues about children’s reasoning and perhaps can help us design effective instruction. To this end, we assume a theoretical framework based on developmental research that should provide us with some insights into why some ideas emerge and how they develop.

A large number of investigations have studied the first ideas children have about multiple topics in domains such as science and mathematics. These works have shown that students often hold ideas that are at odds with the scientific consensus. There is also general agreement that children bring these ideas to the school and that they interfere in the process of learning. These conceptions often persist even when the student has received specific

instruction. Vosniadou and Brewer (1992, 1994) used the term “entrenched” to refer to some beliefs that are very hard to change. Often these ideas persist and coexist with the correct knowledge in a contradictory way (e.g., Berti, Toneatti, & Rosati, 2010; Evans, 2000; Potvin, Masson, Lafortune & Cyr, 2015). Other times children create synthetic models (Vosniadou & Brewer, 1992) in which only a peripheral conceptual change (Chinn & Brewer, 1993) is achieved. In this case, part of the new conception is integrated into the old one to form a hybrid.

It seems clear that one of the starting points for research is to learn more about what types of beliefs students have, to understand how teachers can connect this knowledge to the new content (Limon, 2001). In this respect, we see one important contribution of this study is that it is focused on the economic domain. As mentioned earlier, most of the previous studies have been carried out in the field of science. In comparison, few investigators are interested in studying how children reason about economics. This lack of interest is quite striking given the importance of promoting economic knowledge.

The present study attempts to fill that gap and uses a developmental perspective that has been previously adopted by investigators. Moreover, much of what is known about the development of children’s understanding of economics comes from the Piagetian tradition (1932). From these studies, we know, for example, that the currently accepted notion of “profit” is difficult to acquire and that only from the age of 10-11 do children come to know that shopkeepers make profits because there is a difference between the buying and the purchasing price (e.g., Berti & Bombi, 1988; Delval, 2013; Delval & Echeita, 1991; Jahoda, 1979). Other studies (e.g., Berti & Bombi, 1988; Diez-Martinez & Delval, 2010; Jahoda, 1981; Ng, 1983) have investigated the understanding of the concept of profit in banks, revealing that it is not until children are 13-14 years of age that they recognize that banks make money by charging interest on loans.

Concerning the development of the understanding of work, research has highlighted some very interesting beliefs that are discordant with accepted economic explanations. For example, the surprising idea that one must pay to obtain a job has been regularly found in children from different countries until the age of 11 (e.g., Berti & Bombi, 1988; Delval, 1994; Furth, 1980; Leahy, 1983b). Another more widespread belief is that the money to pay workers comes from external sources such as the government, the bank, or the money saved by the boss (e.g., Berti & Bombi, 1988; Danziger, 1958; Jahoda, 1979, Leiser, 1983; Sierra, 1997; Wosinski & Pietras, 1990). In addition, Berti and Bombi (1981) reported that children use this idea when attempting to comprehend information about work and payment (p.60). This belief disappears at approximately the age of 10-11, which is when children learn that money to pay workers comes from profits.

Despite the obvious interest in this type of research, in recent years, there have been almost no studies showing how children develop an understanding of economics. As a result, we find that many topics remain uncovered, and consequently, we do not know how children think about matters of great interest. In this sense, our analysis will show evidence that the notion of surplus value and the understanding of the economic value of labor—which is a topic that has never been treated by the literature—is of great importance to properly understand the real meaning of employment relationships. Certainly, an employer-employee relationship is a type of economic exchange in which both parties give and receive something. Consequently, to grasp the reciprocal character implicit here, children must be able to properly conceptualize the elements included in the exchange. Then, at first, a child must understand that work increases the value of the commodities. Implicit here is the idea that the employer can only obtain a profit from the work performed by their employees if the value generated by them is higher than their wages. Therefore, the difference between the cost of

labor and its value is what the worker gives in return for the money paid as a wage. Marx called such a differential “surplus value” and is what allows employers to earn a profit.

Some hypotheses guided this study. Based on the body of literature showing that children have alternative conceptions concerning scientific and economic notions, we expected that children incorporate their intuitive conceptions into their explanations when they are asked about the phenomena under study. We also expected that these conceptions would not match the accepted economic explanations. In this respect, we hypothesize that the complexity of responses will increase with age and that the acquisition of an economic view will develop progressively. As previously stated, our study differs from the previous studies in the sense that we interviewed children in a context of economic anomalies. Since we are not aware of the existence of a similar study, we cannot predict how children will react to such data.

Method

Participants

The participants included 130 children divided into the following five age groups: 8-9 years (N=29); 10-11 years (N=29); 12-13 years (N=27); 14-15 years (N=24); and 16-17 years (N=21). Participants were drawn from two constraining socioeconomic areas in the city of Madrid, Spain. Slightly less than half (48%) came from a private school located in the city center, and the remaining children (52%) were from a low-SES city in southern Madrid (Parla).

The students were asked to report their parents' occupations and were also asked if the economic crisis had worsened their family's economic situation. The vast majority (83,9%) of upper-middle-class parents had professional occupations (e.g., doctors, teachers), while working-class parents were mostly (83,8%) low-income workers (e.g., cleaners, cashiers). In

terms of the impact of the crisis, lower-class children were much more affected by parental job loss (32,4% reported that at least one of their parents recently lost a job). In this connection, it should be noted that Parla is an area facing high socioeconomic vulnerability in which the construction industry had a huge presence in the years before the crisis.

Although the influence of socioeconomic status was an initial concern of this research, only a few significant differences emerged from the comparison between social classes. Therefore, the data for the two social-class groups were pooled, and only comparisons across age groups are presented in this paper. This approach enables us to focus on those aspects that most clearly address developmental issues, such as the cognitive mechanisms underlying progress.

The headteacher of each school was informed about the research, and parental written consent was obtained. Furthermore, the interviewer asked participants for their verbal consent and ensured them that their data would remain confidential and that their responses would be used exclusively for the present investigation.

Interviews

Individual semistructured interviews were conducted following the clinical method (Piaget 1926/1933). Participants were interviewed in a quiet room provided by the school. The interviewer presented herself and explained that she was interested in their opinions about some matters taking place in the world. The interviews lasted from 30 to 45 minutes on average and were audio-recorded and transcribed verbatim.

The clinical interviews included conversations between the interviewer and the children with a focus on the topic of interest. It should be emphasized that the art of interviewing is not to observe whether the children give one or another answer but to let them talk freely to discover their spontaneous tendencies (Piaget, 1926, p.14). In other words, we

were not interested in a specific type of response, as we were concerned about how the child reasons and arrives at these ideas. To accomplish this task, the interview must be guided by the children's responses to avoid influencing their responses.

As Table 1 shows, we started the interviews with two hypothetical situations, each dealing with either a case of unemployment or a decrease in salary. An important feature of this study is that the interviews were conducted in the aftermath of the financial crisis (2013-2014), and these stories were likely to be familiar to all the children. There was also a set of common questions (see also Table 1). Other questions were introduced by the interviewer in an attempt to best follow the child's train of thought. This means that the course of the interview depended very much on the child's responses. For example, if the child said that unemployment was due to the president's lack of money, the subsequent question was "What does the president have to do with salaries?" Frequently, the child said that money for salaries comes from the president. In that case, their ideas were tested by asking, for example, why the president pays salaries, how much does the president pay, or which criteria the president uses. The main purpose of these questions was to understand why the child thinks as she or he does.

Table 1

Questions used to investigate children's explanations for unemployment and lower wages in the aftermath of the 2008 economic and financial crisis.

Unemployment	<p>Hypothetical situation</p> <p>Maria has always worked. However, she has been without work for more than a year. Why do you think she is not working?</p> <p>Common questions</p> <p>Causes: Are there more people who have recently lost their jobs? Why did this happen? Are there other countries... where unemployment has also increased/is in a better situation? Why?</p>
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	<p>Individual solutions: If you were Maria, what would you do to work again? Why is getting a job easier for some people than for others?</p> <p>General solutions: Who must solve this problem? How? or If you were the president, what would you do?</p>
Decrease in salary	<p>Hypothetical situation</p> <p>Pedro works in construction. He and his family used to go on vacations but this summer they will stay home. Why do you think they are unable to go on vacation?</p> <p>Common questions</p> <p>Causes: Are more people receiving lower wages? Is that happening in other countries? Why/why not?</p> <p>Individual solutions: If you were Pedro, what would you do?</p> <p>General solutions: If you were the president, what would you do?</p> <p>If there were no mentions of the crisis, the child was asked at the end of the interview: Have you heard anything about the crisis? Do you think it has something to do with the stories I told you?</p>

With the results obtained from a pilot study, we developed some counter suggestions that, as in all Piagetian interviews, played an important role in our interviews. Several formulas were commonly used. For example, as suggested by Garcia-Palacios, Horn, and Castorina (2015), we said “a child of your same age told me...” when trying to avoid the effects of asymmetrical relationships between adults and children. Other formulas (e.g., “I have read in the newspaper that...”) were used when we wanted to create a conflict in the child under the influence of a widely credible source of information. Of particular importance in this paper were some scenarios created to determine if applied knowledge coincided with general knowledge. For example, if the child said that “people have been fired because the president did not pay their salaries”, then the interviewer said, “Let’s imagine we want to run a shoe shop; where does the money to pay salaries come from?”

Coded

The children's responses to our questions provided valuable information about their level of knowledge of the economic value of labor. First, we categorized, based on our interviews and previous research, some alternative conceptions (e.g., the money to pay workers comes from external sources) that were used by children to explain unemployment and lower wages (e.g., people have been fired because the president did not pay salaries). Then, we reasoned that the students have these alternative conceptions because they do not know that workers create value (Level 1). Subsequently, we identified the presence of a mixture of contradictory, hybrid, or incomplete responses that were all placed in the same group (Level 2). A third group (Level 3) was formed by children showing awareness of the economic concept of surplus value (i.e., that workers produce profits by creating more value than their cost in wages).

We classified each response type, and a second scoring was carried out by the first author. In that analysis, each child was assigned to one of the three levels of understanding. A second judge (the second author), who was unaware of the participants' ages, scored 10% of the sample. The overall reliability for the three levels was high (Krippendorff Alpha: 0.802)

Results

The results are introduced in two sections. In the first section, we present, in a qualitative way, how children reason about unemployment and lower wages. Here, we will focus on the possible relationship that exists between the emergence of some conceptions and the level of knowledge of the economic value of labor. In the second section, we present some quantitative findings.

Qualitative analysis

The results show that some alternative conceptions progress through several changes toward other accepted economic explanations. Whereas many factors might affect the progress, this analysis revealed that some of these beliefs emerged because the child has difficulty understanding the seemingly simple economic idea that the work performed by a worker has economic value. In addition, we have found that once children discover that workers create value, the quality of their explanations depends on how they respond to the following question: What is the value the worker creates?

As mentioned in the Introduction section, in terms of basic economics, a worker must create more value than the cost of her or his salary. The difference is the employer's profit (the surplus value), and this is the only reason why bosses hire workers. As we will see, there is not a sudden understanding of this notion, but rather the contrary. The acquisition of this economic concept is very slow and follows a three-level progression.

Level 1 Conceptions: The work done by a worker has no economic value.

These participants do not understand the seemingly self-evident idea that the worker creates value. The following three alternative conceptions appear to be linked to the lack of knowledge regarding this idea: (1) the worker is a waste of money; (2) the money for salaries comes from external sources; and (3) one must pay to have a job.

At this level, children know that people get paid at work, but they do not see that the work done by the employee has economic value. This means that the salary is thought to be an amount of money that the worker receives without giving anything in return. Consequently, the employee is conceptualized as a mere waste of money. From this viewpoint, the more workers there are, the less money the one who pays the salaries would have. But who pays salaries? not understanding that labor is a source of value, the child says that the money must

come from somewhere else (e.g., the government). A third idea that appears to arise from the difficulty of understanding that workers create value is that one must pay to have a job. Our interpretation suggests that those who respond in this way are attempting to explain what the worker gives in exchange for the money received. Since these children do not understand that work is an element of exchange, they respond to the reciprocity problem by constructing the compromise solution that workers also must give money.

Table 2 presents some excerpts from the interviews, which illustrate how children integrate these conceptions into their attempts to explain why people experienced job or wage losses in the context of the 2008 economic crisis.

Table 2

Representative responses by children who hold Level 1 conceptions.

Conception	Protocol examples
The worker is a waste of money	<p>Case 23 (9;3): - Why does a boss fire an employee? <i>To keep that worker's money for himself.</i> -And why did he hire the worker initially? <i>I don't know.</i></p> <p>Case 25 (9;9): - Is this happening to many people? <i>Yes, because bosses are in crisis, and they are lowering salaries.</i> - Why do bosses pay lower salaries? <i>Because they have paid many employees, and now they have to fire them. They are getting poorer and poorer, and they have to pay less (...)</i> -Why do you think that someone would want to create a company? <i>Maybe someone pays them or maybe they pay.</i> -Do they earn something doing that? <i>The person who starts a company?</i> -Yes. <i>They lose.</i> -Then, why do they do that? <i>I don't know, because they lose money giving it to other people</i> - But those who create companies, don't earn anything? <i>They can make friends among the employees they have.</i></p>
External source of money	<p>Case 54 (11; 4): <i>They have to pay him (Pedro) less</i> - Why? <i>It's like a domino effect. If the government decides to pay less to someone... If they decide to pay half, then they have to also pay workers half, and so on.</i> - Does the government pay bosses? <i>Yes.</i> - Why does the government pay bosses? <i>Because they print the money, and they want all the money for themselves. However, they can't have all the money because it would be impossible for us to have food.</i></p>

Pay for working	Case 11 (08; 10): <i>Because people don't have money and they can't buy things, and I also guess that one must pay for the job. -How? What does it mean? Because if they have given you some euros, maybe you must return one -Why? Because they have given you money too -But you have worked. Then, why do you have to pay? Silence.</i>
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From the reasons children used to explain why people lost their jobs or why bosses lowered salaries, we noticed that the response “bosses have lost money paying workers” appeared often. These participants thought that the *worker is a waste of money*, establishing an inverse relationship between the number of employees and the money that the one who pays wages has. One further interesting point is that these responses reflect a static conception of money. As the examples above demonstrate, some children think that bosses laid off workers because “they wanted to keep that money for themselves” (protocol number 23), while others say that bosses do not have money because “they have given all their money to workers” (see protocol number 25).

Some other responses suggested that the child thinks that workers are only a waste of money. Protocol number 25 is very illustrative. According to this child, bosses are motivated to create companies “to make friends”. Failing to understand that the worker creates value, the child cannot understand why someone would want to hire workers in the first place. From the child’s perspective, the only way to justify the act of hiring employees is through the morality or other possible noneconomic interests of these figures.

The second conception that appears to have its origins in the inability to perceive the value that the worker creates is the idea that *the money for salaries comes from external sources*. We believe that children do not understand that employees are paid the money they generated themselves simply because they are not able to attribute to workers the capacity to generate anything. Consequently, no mention is made of money earned by selling or

producing goods, and the salary is an amount of money that the employee receives from somewhere else.

The excerpt from the interview above (protocol number 25) was the case of a child who believed that bosses are rich and pay salaries with their own money. Other participants stated that the money comes from the government, the bank, or the local council. Regarding explanations about unemployment and reduction of wages, many children said that the authority figure prints and distributes money among workers. Their explanations were, for example, that the printing machines are broken or that the money was stolen. Other children believed that the president had less money or that he took much money for himself instead of spending it on salaries (see protocol number 54).

Finally, the idea that *one must pay to have a job* also appears to be related to the inability to understand that workers create value. In previous responses, we observed that children might have difficulties perceiving the value created from the employee side. Here some children first deal with the reciprocity problem by asking themselves what the worker gives to the boss in return for the salary received and mention the idea that one must pay to receive a job. This idea constitutes a compromise solution, since it allows the children to temporarily resolve the problem of reciprocity but at the same time indicates that they are not yet able to understand what the real economic contribution of an employee is. An illustrative example is protocol number 11. As we can observe, the child does not understand that the “work done” is what workers provide to bosses, which leads him to think that workers must pay money in exchange for the money they have received. Some explanations for unemployment were based on this belief, with the typical response being that people are unemployed because do not have money to pay for work.

Level 2 conceptions: The work done by a worker has some economic value

There is progress in the idea that labor has economic value. Now children know that workers produce and sell goods for which there is a demand in the market. They also know that this is the way bosses obtain money to pay salaries. Therefore, the child has discovered that labor is a source of money with which workers are paid.

There is not, however, a sudden replacement of the previous conception (the worker contributes nothing) with the accepted conception (workers contribute more than their cost in wages). Here, we present a heterogeneous group representing an intermediate step between these two representations. In particular, this analysis is focused on the following two aspects: the persistence of the external source conception and the gap that still exists between the child's current conception and the accepted view of the economic value of labor.

As will become clear from the interview extracts presented in Table 3, the idea that workers are paid by the government or banks is a deeply entrenched belief that still coexists with the new knowledge. Here, we can distinguish two types of responses, depending on whether the initial conception had been altered.

Table 3

Representative responses by children who hold Level 2 conceptions

Protocol examples
<p>Case 77 (13; 01): - Why do you think people have been fired? <i>Because they... I don't know... companies fire people because there isn't money. The president cannot pay many people, the state cannot...</i> -Does the president pay workers? <i>Silence.</i> -Who pays employees? <i>Bosses, but bosses are paid by the president.</i> -Let's pretend that we want to open a shop and we hire some employees. Do we receive money from the president? <i>If we open a shop, the money we have is from people who pay us (consumers), and they get paid in their jobs.</i> -Does the president pay some money to us? <i>No.</i> -As you have said that bosses are paid by the president and... <i>Bosses have... I don't know... but if they open a shop, they get paid by the people who buy in the shop. These people give them money.</i></p>
<p>Case 100 (15; 06): -Why do you think she has been fired? <i>Because the company isn't receiving money anymore. The state gives less money than before, and companies need to get people fired. She was one of them.</i> -Does the state give money to companies? <i>Yes.</i> -Why?</p>

They need it to exist. (...) -If we want to start a new business... Let's imagine a shoe shop, ok? Yes. (...) -Maybe we would need an employee, who will pay that employee? We do, with the money earned. (...) -Why does the state give money to companies? I guess the state lends money, the same as banks do. (...) I have just remembered that the state is who provides money, who pays people. It takes care of people. -Which people? Those who work. -Does the state pay workers? Because we have said that if we open a shop, we should pay employees. We do and the state pays the boss and the boss pays workers.

Case 60 (12; 02): -What has suddenly happened? Political parties pay less to factories and shops, and they can't maintain their jobs. (...). -How do factories make money? By selling the things they have and their products. -As you have mentioned that political parties should give them money, what does that have to do with the fact that a company closes? Because they can't maintain their installations and their employees, and they don't earn more money than the ones they pay.

First, many participants hold two opposing ideas at the same time, with the old one remaining unaltered. Children often begin by saying that unemployment is caused by the government (e.g., the government has no money to pay all workers). Then, when the interviewer presents them a neutral situation (Let's imagine that we want to start a shoe shop, where does the money for salaries come from?), they go on to explain that bosses pay workers with money obtained by selling products (see protocol number 77). The result is that the children contradict themselves.

Why do both contradictory beliefs coexist? We believe that participants do not explain the crisis using the correct idea simply because this idea is very difficult for them to apply. In other words, they cannot apply what they know to explain the economic anomalies (i.e., why salaries stopped being paid). If they say that salaries are paid with profits, then their answers should include an explanation for the reasons why profits decreased. This is much more complex than simply saying that the president provided less money. Case number 100 might serve as an example. This child repeatedly alternated between both conceptions, acknowledging that salaries come from profits, although she has just said that companies lay off workers because they do not receive money from the government. At the end of the

interview, she chose to abandon the idea that salaries come from profits in favor of her initial belief. It appears this is so because her attempts to answer the interview questions from the basis of the new idea had not been very fruitful.

Second, we have found that some children construct a hybrid conception with parts of the new and the old belief. We have called this response “complementary sources of money” because the money for salaries comes from both sources. Protocol number 60 is an example. Even when the child knows that factories make money by selling products, he also states that factories must receive external money to pay workers. We believe that this response is a creative compromise solution for children who do not want to abandon the correct idea that workers are paid with earnings but also find it very difficult to apply this idea to explain anomalies. By postulating that money comes from both sources, the child has found a simple way to make sense of these phenomena without contradicting the correct information. Additionally, it is interesting to note that many children made great efforts to restructure their ideas to be as congruent as possible with the accepted view. For example, those who stated that the external money is a loan that must be returned with profits (see protocol number 100).

Another important aspect of this group of responses is that the understanding of the economic value of labor seems to be incomplete. In particular, children seem to be unaware that the work performed by the worker must also be profitable for the boss. The complementary sources’ response reflects this. These children assume that incomes derived from labor do not cover salaries, which means that they do not understand that bosses make profits because there is a difference between the cost incurred in the employment of labor and what workers produce. Moreover, we have found some children who hold the idea that the salary is a distribution of profits. Thus, failing to understand that salary refers to a fixed amount of money that employers pay because they expect to make more money, they construct the idea that the money earned is distributed among workers.

Level 3 Conceptions: The value created by workers is higher than the cost of their wages

This level is characterized by the acquisition of the economic concept of surplus value. This means that children now know that workers only receive a portion of the value of their labor and that the difference is the profit of the employer.

These students already know that the main function of the work of a worker is not to pay salaries but rather to generate an additional value that goes to the boss. Once this has been understood, the adolescent can conceptualize the employment relationship as a type of economic exchange: it is now an economic transaction in which the employer pays the price of labor (a fixed sum) because she or he expects to obtain a benefit. Consequently, students have abandoned the idea that wages are shares or percentages of profits and that wages need to be complemented to enable bosses to pay workers. This conceptual advance allows them to think about the loss of employment and wages in more sophisticated ways. Table 3 below presents some of these explanations.

Table 4

Representative responses by children who hold Level 3 conceptions

Protocol examples
<p>Case 99 (15;5)- Why don't companies have money and fire people? <i>Because of taxes and also... For example, if you had a company and you thought you had money to run another, you create another company... when people started to have less money, they couldn't... Let's imagine I run my supermarket and it goes very well, then I open another supermarket... but if people don't have money to spend, then I don't earn the same as before. Maybe I've been losing money for four months and the first solution to avoid further losses is to reduce the number of employees, working the maximum with as few people as possible. The final decision would be to close the company.</i></p>
<p>Case 124 (17; 08): <i>They always want to extract the maximum profit. Then, if you take away a part, they will try to recover that part as much as possible. One way to do this is, for example, instead of having two machines, I will have only one. Or something easy as workers are... If I have 100 employees, it would be better to have only 70, and these 70 must produce more and work harder.</i></p>

Case 128 (17;8): *Usually, people work 8 hours a day. Then, maybe a person with education asks you 800 euros but someone without studies accepts the job for 600 euros. - Are all bosses like that? Yes. - All of them? I think so. - Do you think bosses are bad people? They do the best for them. - Why do you think someone would want to run a business? Because he wants to make money.*

As in the previous level, children also say that employers lay off workers if there are no buyers for the potential commodities. Nevertheless, they also show awareness that the only reason why employers hire employees is the profit motive. From this point of view, if an employer lays off a worker, it is not because there is no money to pay the salary but rather because having the employee is no longer profitable. In times of economic crisis, companies lay off workers in the face of losses or to reduce costs, and the lack of employment is frequently connected to the economic bankruptcies of owners. Indeed, the participants begin to realize that owners reinvest profits and try to repeat that operation whenever possible. Wealth is now viewed as a long-term process referred to as the increase of the value of an initial investment. An economic crisis, however, can interrupt this process (see protocol number 99).

The responses about how to find a job also changed. Some participants said that the chances of finding a job depend on the comparison between the potential value of the labor force and its cost. They believe, for example, that a boss will recruit those who have more qualifications or are younger because they can bring more value to the company. They also say that bosses engage in self-interest behavior, attempting to extract the maximum value at the minimum cost. In many cases, adolescents referred to the situation of skilled workers, stating that the links between incomes and education are much weaker in times of crisis (see protocol number 128).

In sum, these students know that an employment relationship is an economic exchange in which both parties need each other. This is also a relationship between social

classes in which each of these groups has conflicting interests: while employers desire to extract the maximum value without remuneration, employees want to obtain the highest possible percentage of benefits derived from the work they do. Participants also show awareness that this is an asymmetrical relationship and that such asymmetry becomes increasingly clear in crises. Some children said that the crisis has increased poverty and inequality, with the owners of capital accumulating wealth quickly and increasing their wealth. They spoke, for example, about situations in which employers dismissed workers and increased the workload of the others (see protocol number 124). As long as all these situations are viewed as a consequence of the rich taking advantage of someone's weak bargaining power, they tended to judge them as unfair.

Quantitative analysis

The above-described levels are presented in a way that suggests the existence of a progression from level 1 (the worker creates nothing) to level 2 (the worker creates some value) and finally to level 3 (workers create more value than the cost of their wages). Our findings also indicate that there is a change in levels with a change in age. Table 1 depicts the percentages obtained for each level and age group and the χ^2 results.

Table 5

Percentages of participants for each level and age group.

Level of response	Age groups						χ^2	P value
	8-9	10-11	12-13	14-15	16-17			
Level 1	69,0%	37,9%	18,5%	4,2%	0,0%	41,267	0,000	
Level 2	3,4%	27,6%	40,7%	29,2%	14,3%	12,788	0,012	
Level 3	0,0%	6,9%	22,2%	45,8%	57,1%	32,918	0,000	
N=	21	21	22	19	15			

First, it is necessary to note that the percentages in Table 5 do not add up to 100%, as they only represent the share of children who explained unemployment or lower wages by spontaneously alluding to one of the three levels. Of all the respondents (n=130), 98 participants were assigned to a level. This finding confirmed that the presence of these conceptions is not accidental, and they must be taken into consideration.

Second, as previously stated, our results suggest that levels of understanding are associated with age. The first level was the most common until the age of 10-11 and progressively decreased. The second level increased steadily until the age of 12-13 and then slowly decreased. The third level gradually increased and most of the participants (45,8%) could be categorized as knowing the currently accepted economic notion of surplus value only from the age of 14-15. Thus, the picture that emerges here is that the acquisition of this economic concept is a progressive and slow process. Regarding the slow progress observed, one aspect needs to be addressed: the persistence of the idea of the external source. Table 6 shows the frequency of alternative conceptions for each age group.

Table 6

Frequency of alternative conceptions

Categories	Age group					
	8-9	10-11	12-13	14-15	16-17	Total
Pay for working	27,6%	10,3%	3,7%	0,0%	0,0%	N=12
Waste of money	31,0%	31,0%	25,9%	8,3%	0,0%	N=27
External sources	69,0%	41,4%	37,0%	12,5%	0,0%	N=45
Complementary sources	3,4%	20,7%	22,2%	25,0%	9,5%	N=21

Note. Percentages may exceed 100%, as the participants could offer more than one type of response.

As table above shows, the idea that one must pay to have a job appeared only until the age of 11 and only in 12 participants. We have interpreted this result to suggest that this mode

of reasoning is limited to those cases where the children face the challenge of providing an answer to the question of reciprocity, an issue that may not necessarily arise in all of them. Once children understand that workers create value, this idea disappears. This result sounds reasonable, and the challenge is to understand why the belief that money comes from external sources remains.

The external source conception is present in more than one-third (34,16%) of the participants. For us, it continues until older ages (37% of 12-13; 12,5% of 14-15) because it has great explanatory power. One more interesting finding was that some of these students constructed the compromise solution of two complementary sources. This response was not very widespread (N=21) but persisted until the age of 14-15. We argue that children have two contradictory ideas at the same time or created synthetic conceptions because they were attempting to make sense of anomalies. In other words, children needed to make sense of a situation in which salaries are not being paid, but they are not attempting to explain how salaries work (in that case, the child would simply say that salaries are paid with profits). These responses, therefore, are consubstantial to the anomalous context of the crisis. In addition, we believe that children cannot apply what they know to explain the anomaly because their knowledge of the value of labor is still incomplete. Once the student knows that workers must create more value than the one they receive (which occurs around the age of 14-15), the belief that there is an external source that complements earnings disappear. This indicates that the persistence of the external source conception might be due to the lack of knowledge of the economic concept of surplus value.

Discussion

The results of this study confirm our first hypothesis that young children's alternative conceptions of economics are not random ideas and that children use them to interpret the

phenomena of unemployment and lower wages. The findings also support our second hypothesis. As we expected, there is a change with age from alternative conceptions to others accepted by economists. Specifically, this work suggests that children's capacity to reason about these phenomena is strongly related to their understanding of the economic value of labor. More specifically, we have found that there is a developmental sequence from the belief that workers create nothing to the economic concept of surplus value.

In fact, we believe that the alternative conceptions are the result of the children attempting to reason without an understanding of the apparently simple idea that the worker creates value. As we have observed, these ideas are logical and reasonable constructions made from the point of view of someone who thinks that workers only receive money but give nothing in return. Our thesis for explaining children's failure to understand this idea is that they cannot infer the nonvisible properties of this construct. In this sense, we believe that the response that one must pay to obtain a job (e.g., Berti & Bombi, 1988; Delval, 1994; Furth, 1980; Leahy, 1983b) constitutes evidence to support this claim. In this respect, we should note that in their attempts to address the question of what the worker gives to the boss, these children have replaced the economic value of labor (a nonvisible construct) with money (the most salient economic construct).

From an educational perspective, this finding highlights the importance of not taking for granted that children know what seems obvious from an adult viewpoint. We also believe that these noneconomic alternatives will not disappear just by giving children the correct information. Evocations of alternative conceptions decrease as children come to understand that the work performed by the worker has economic value. Therefore, we think that young children would greatly benefit from an instruction that emphasizes the discovery of underlying and nontangible aspects of the economy.

Another important finding was that some beliefs were rapidly extinguished compared with others that were very persistent. This is in line with those studies showing that some beliefs are more entrenched than others (Vosniadou & Brewer, 1992, 1994). Even when students know that workers are paid with money derived from labor, the idea that money comes from other sources is likely to coexist in a contradictory way or to be incorporated into a hybrid or synthetic framework. These results confirmed that the coexistence of alternative and scientific conceptions (e.g., e.g., Berti, Toneatti, & Rosati, 2010; Evans, 2000; Potvin, Masson, Lafortune & Cyr, 2015; Vosniadou & Brewer, 1992) also occurs in the economic domain. This finding, however, is not in line with previous studies (e.g., Berti & Bombi, 1988; Danziger, 1958; Jahoda, 1979, Leiser, 1983; Sierra, 1997; Wosinski & Pietras, 1990), which showed that children directly progressed from the belief that workers are paid by external sources to the idea that they are paid with profits. Rather than contradict one another, these distinct results highlight the role of the anomalous context in the formation of new knowledge. From our view, these responses emerged in the context of the crisis to make sense of a situation involving an economic anomaly.

According to us, this result constitutes evidence in favor of the induction of cognitive conflict through the exposition to anomalous contexts, which is the same strategy as scientific use to make progress (Limon & Carretero, 1997). We think, therefore, that from the age of 12-13, students could obtain benefits from instruction in which distinct scenarios are presented, one anomalous and another neutral. Nevertheless, to help them progress teaching must be focused on the understanding of the economic notion of surplus value. Indeed, we argue that these children could benefit from direct instruction (explaining to them, for example, that employees are not paid with a percentage of profits, but they receive a fixed payment).

Finally, it is worth noting that our findings complement what is known about children's understanding of economics, showing the developmental progression of the idea of profit in a new context, i.e., the context of employment relationships. Several studies have previously shown how children progressively acquire the idea of profit in topics such as buying and selling (e.g., Berti & Bombi, 1988; Delval, 2013; Delval & Echeita, 1991; Jahoda, 1979) and of banks (e.g., Berti & Bombi, 1988; Diez-Martinez & Delval, 2010; Jahoda, 1981; Ng, 1983). However, this is the first publication showing how children acquire awareness that there is a difference between the price of the labor force and its economic value (which is the profit that goes to the employer's pocket, the surplus value).

Our study has limitations. Of particular concern is that the ages corresponding to each level are those in which the notions emerged when they explained phenomena, but we cannot be sure that these are the ages at which the notion of surplus value emerges. Additional research will be required to confirm the specific ages. Indeed, we consider that further analysis of the second level would be of great interest. In this regard, we wonder, for example, how widespread the idea that wages are shares or percentages of profits is.

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