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More than fun and money. Worker Motivation in Crowdsourcing – A Study on Mechanical Turk

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ABSTRACT

The payment in paid crowdsourcing markets like Amazon Mechanical Turk is very low, and still collected demographic data shows that the participants are a very diverse group including highly skilled full time workers. Many existing studies on their motivation are rudimentary and not grounded on established motivation theory. Therefore, we adapt different models from classic motivation theory, work motivation theory and Open Source Software Development to crowdsourcing markets. The model is tested with a survey of 431 workers on Mechanical Turk. We find that the extrinsic motivational categories (immediate payoffs, delayed payoffs, social motivation) have a strong effect on the time spent on the platform. For many workers, however, intrinsic motivation aspects are more important, especially the different facets of enjoyment based motivation like “task autonomy” and “skill variety”. Our contribution is a preliminary model based on established theory intended for the comparison of different crowdsourcing platforms.

Keywords

Crowdsourcing, Survey, Mechanical Turk, Motivation Theory, Extrinsic Motivation, Intrinsic Motivation, Model

INTRODUCTION

The term “crowdsourcing” was initially introduced by Howe (2006) who defined it as the outsourcing of a function or task traditionally done by a designated agent to an undefined network of laborers carried out by a company or a similar institution using a type of “open call”. Today the term is used for various phenomena like user generated content, co-creation, social engagement, open innovation, knowledge aggregation, or prediction. For this paper, we focus on paid crowdsourcing where monetary remuneration for all or some (e.g. design contests) of the contributors is an integral part of the crowdsourcing realization.

The popular paid crowdsourcing provider Amazon Mechanical Turk (www.mturk.com) is a marketplace for online work. Crowdsourcing organizations (called “requesters”) can post small tasks like content generation, transcription, image labeling, or web research (called “HIT” = Human Intelligence tasks) that are processed by members of the crowd (called “workers”), mostly for a fixed monetary remuneration. Research shows that the overall wage level (\$1.38/h median reservation wage) can be considered quite low for western standards (Horton and Chilton, 2010) while the demographics of the workers is very diverse in terms of country, age, education, and household income (Ross, Irani, Silberman, Zaldivar, and Tomlinson, 2010). Therefore, it is assumed that motivational factors other than immediate payoffs influence the participation on the platform.

In this paper, we analyze the relevant aspects motivating people to work on tasks announced in a paid crowdsourcing environment. We especially focus on the questions which aspects of motivation are most important, and whether we can observe effects of demographics and economic situation (e.g. income or working condition) on certain aspects of motivation. While corresponding literature exists in related areas like open source software (e.g. Lakhani and Wolf (2005)) and specific domains of crowdsourcing like user generated content (e.g. Schroer and Hertel (2009) about Wikipedia) or competitions (Brabham, 2008; Leimeister, Huber, Bretschneider, and Krcmar, 2009), we are not aware of research on the comparison of different motivational aspects on different crowdsourcing realizations.

Therefore, we use the established models and findings and classical motivation theory to propose a combined model of workers motivation in crowdsourcing. In a first step, we conduct an online survey to test the model on Mechanical Turk. In future

work, the model could be tested on different crowdsourcing platforms to identify differences and study how certain motivational aspects relate to different realizations of the crowdsourcing process.

This paper is organized as follows: In the next section presents related literature on 'worker's motivation in different crowdsourcing domains is discussed. Then, we describe the theoretical foundations in motivation theory that lead to the development of our proposed combined model for motivation in crowdsourcing environments. In the following section, the survey of workers on Mechanical Turk is described. The paper concludes with a summary of the most significant results before giving an overview of future research directions.

RELATED LITERATURE

Leimeister et al. (2009) analyze motives and incentives that lead to participation in the "SAPiens Idea Competition". Based on literature from sports competitions and open source, they derive the four overall motives "Direct Compensation", "Learning", "Self-Marketing" and "Social motives". They do not include intrinsic motivations because "internal incentives solely arise from a participant's inner motives" and are therefore out of the scope of the paper since organizers are not able to influence them.

Brabham (2008) assesses the motivation of submitters on iStockphoto, a popular online stock agency for photographs, by performing an online, questionnaire-based study related to various motivational components. The results show that the possibility of earning money is the most dominant motivation to participate at iStockphoto, followed by the generated fun. (Brabham, 2010) analyses the motivational components for the participation at the t-shirt design contest site Threadless. From qualitative interviews the author extracts five main motivations (see Table 1).

Ipeirotis (2010) gives insight into workers motivation to participate in a purely paid crowdsourcing environment like MTurk. He asks participants of a survey why they complete tasks on MTurk by giving a choice of six simple statements. However, some of these statements contain several motivational factors at the same time. Organisciak (2008) is one example of many analyses of crowdsourcing motivation that are published in online sources like blogs.

In Table 1, the motivation components identified from these references are displayed. We categorize them according to the overall categories from our model that is explained in the next chapter.

Paper	Focus	Intrinsic Motivation		Extrinsic Motivation		
		Enjoyment Based Motivation	Community Based Motivation	Immediate Payoffs	Delayed Payoffs	Social Motivation
(Leimeister et al., 2009)	Idea Competitions	-	-	„Direct compensation“	„Learning“ „Self-Marketing“	„Social motives“
(Brabham, 2008)	Content Market	“Creative outlet”; “Fun”; “Produce [content] that I like”; “Passes the time when I am bored”	“Build a network of friends”	“Opportunity to make money”	“Improve skills” “Earn a reputation”	“Better way to make [content]” “Build a network with other creative people”
(Brabham, 2010)	Design Competition	-	“Love of community”; “Addiction’ to the community”	“Earn money”	“Improve creative skills” “Get employed as a freelancer”	-
(Ipeirotis, 2010)	Mechanical Turk	“Fruitful way to spend free time”; “To kill time”; “Tasks are fun”	-	“Primary source of income” “Secondary source of income”	-	-
(Organisciak, 2008)	Crowdsourcing	Fun; Boredom; achievement (by the action); Interest (curiosity)	Charity; Academia; Participation (Social Human Interaction)	Money	Self-Benefit (directly and indirectly from the action)	Forced

Table 1. Motivation constructs mentioned by a sample of related literature

MODEL DEVELOPMENT

Foundations

Motivation Theory

The basic idea behind motivation theory is to explain the factors that drive people to take an action. Modern scientific research agrees that different motivational states can be distinguished by the level of activation as well as by the goals and attitudes that caused the activation. These are assumed to reflect the specific needs of an individual (Ryan and Deci, 2000).

Following the Self-Determination Theory formulated by Deci and Ryan (1985), motivations can be split in two main types: Intrinsic and extrinsic motivation. *Intrinsic* motivation exists if an individual is activated because of its seeking for the fulfillment generated by the activity (e.g. acting just for fun). In the case of *extrinsic* motivation the activity is just an instrument for achieving a certain desired outcome (e.g. acting for money or to avoid sanctions).

The differentiation between intrinsic and extrinsic motivation is completely different from the one between *internal* and *external* motivation. Only intrinsic motivation can be clearly classified as internal. However, according to the Organismic Integration Theory, a smooth transition between internal and external motivation seems to exist within the extrinsic sector depending on the type of regulation. (Deci and Ryan, 1985; Ryan and Deci, 2000)

In some cases, the practical differentiation between extrinsic and intrinsic motivation seems to be very arguable – especially taking the process for the internalization of values into consideration. In contrast to the Self-Determination Theory, Lindenberg (2001) states that individuals acting on the basis of a principle have to be considered intrinsically motivated because they follow a rule that has to be respected for its own sake.

Open Source Software (OSS) Development

Crowdsourcing shares one main attribute with the Open Source Software (OSS) approach: The potential involvement of regionally und culturally completely distinct workers collaborating over the internet. But there are some differences regarding the role of the requester and the ownership of the work results. Because of the combination of substantial similarities and difference in detail, we find it appropriate to adapt an existing motivational model out of this sector. A similar approach is also suggested by Kleemann, Voß, and Rieder (2008).

Many papers explaining the motivation in the field of open source software are limited to a certain point of view. For example Hertel, Niedner, and Herrmann (2003) focus on the social factor of open source software, while Lerner and Tirole (2002) use labor economics only, and Roberts, Hann, and Slaughter (2006) use a very OSS specific structural model.

However, the approach of Lakhani and Wolf (2005) seems to be better suited for our purposes. Similar to Osterloh, Rota, and Kuster (2002), they describe a basic categorical model that distinguishes between intrinsic and extrinsic motivation which are further separated in the categories “Enjoyment Based Motivation”, “Community/Obligation Based Motivation” on the intrinsic as well as “Immediate Payoffs” and “Delayed Payoffs” on the extrinsic side.

Work Motivation and Education Theory

Due to the extensive coverage of motivational aspects, the model proposed by Lakhani and Wolf (2005) seems to be suitable as a basis for proposing a model for the crowdsourcing environment. On the other hand, it is crucial that all relevant aspect of motivation is covered to ensure comparability between different platforms. As working on paid crowdsourcing tasks has strong similarities to a regular daily job, a popular motivational model in classical working conditions should be analyzed for comparison.

One of the most popular and accepted models in this vein is the Job Characteristics Model by Hackman and Oldham (1980). It defines three psychological states, which are critical for the internal motivation of a worker: a) Experienced meaningfulness of the work, b) experienced responsibility for outcomes of the work and c) knowledge of the actual results of the work. For each of them, one or more stimulating job characteristics are identified. These are: Skill variety, task identity, task significance (a), autonomy (b) and feedback from the job (c). (Hackman and Oldham, 1980, pp. 71-82)

Additionally, theory on returns of education could give further insights about additional motivations linked to delayed pay-offs. Weiss (1995) names two different types of effects which explain how knowledge and skills can be transformed into material advantages: Signaling and the establishment of human capital. Advancement of human capital means to acquire abilities that are directly usable for value creation, signaling is defined as sending signs that allow conclusions on existing abilities of the sender.

Combined Model

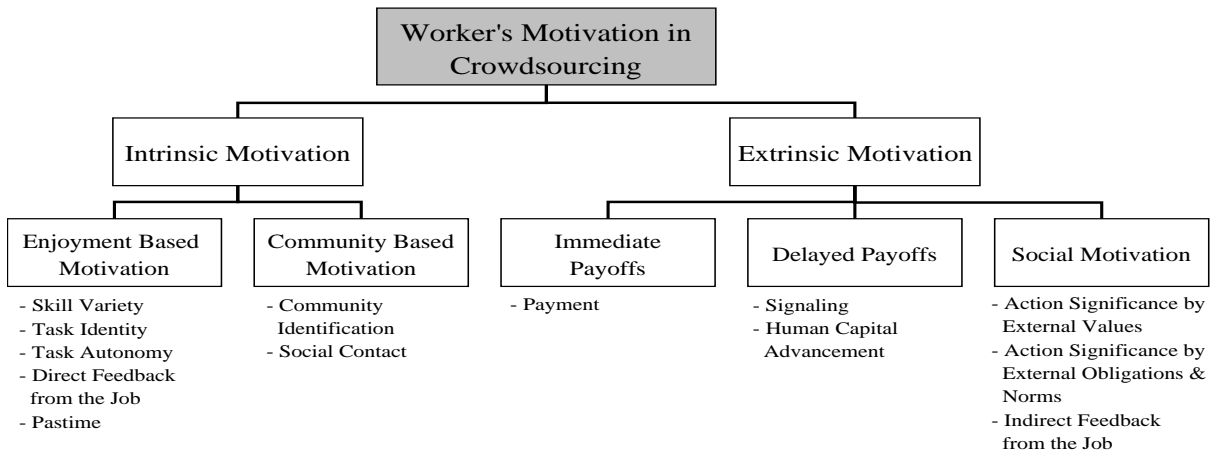


Figure 1: A Model for Worker’s Motivation in Crowdsourcing

Our proposed model (see Figure 1) composes motivating factors, which can be classified either intrinsic or extrinsic of type. Each category is influenced by one or more constructs. Those factors affect the overall motivation of workers. The breakdown into intrinsic and extrinsic motivation is just a theoretical classification.

Intrinsic Motivation

Within the group of intrinsic motivation, two categories are differentiated: Enjoyment Based and Community Based Motivation. The category of *Enjoyment Based Motivation* contains factors that lead to that lead to the sensation of “fun” that might be perceived by the workers. These factors are measured by the constructs Skill Variety, Task Identity, Task Autonomy, Direct Feedback from the Job and Pastime. The category of *Community Based Motivation* covers the acting of workers guided by the platform community. Relevant constructs are the Community Identification and Social Contact. Table 2 is intended to give an overview over the constructs of the model.

		Definition	Example	Source
Enjoyment based	Skill Variety	Usage of a diversity of skills that are needed for solving a specific task and fit with the skill set of the worker. The higher the variety of fitting skills is, the greater should be his motivation to choose a specific task	A worker picks a translation task because he likes translating and wants to use his skills in his favorite foreign language.	(Hackman and Oldham, 1980)
	Task Identity	Refers to the extent a worker perceives the completeness of the task he has to do. The more tangible the result of his work is, the higher will be his motivation	A worker picks a task because it allows him to see how the result of his work will be used – e.g. writing a product description for a website.	
	Task Autonomy	Refers to the degree of freedom that is allowed to the worker during task execution. If more own decisions and creativity are permitted, the worker’s motivation will be better	A worker who is motivated because a certain task allows him to be creative – e.g. designing a logo or a website.	
	Direct Feedback from the Job	Covers to which extent a sense of achievement can be perceived during or after task execution. Explicitly limited to direct feedback from the work on a task, not by other persons	A worker who is motivated because a task provides the opportunity to check if his result is correct – e.g. a programming task.	
	Pastime	Covers acting just to “kill time”. It appears if a worker does something in order to avoid boredom	A worker who uses the platform or works on various “random” tasks because he has nothing better to do.	(Brabham, 2008; Ipeirotis, 2010)

community based	Community Identification	Covers the acting of workers guided by the subconscious adoption of norms and values from the crowdsourcing platform community, which is caused by a personal identification process. (based on the idea of principle-induced motivation)	A worker, who only accepts tasks from requesters with a good reputation, because they are known as valuable supporters of the platform and its community.	(Lakhani and Wolf, 2005; Lindenberg, 2001)
	Social Contact	Covers motivation caused by the sheer existence of the community that offers the possibility to foster social contact	A person is active on a crowdsourcing platform just to meet new people.	(Brabham, 2008, 2010)

Table 2. Constructs of Intrinsic Motivation

Extrinsic Motivation

Three motivational categories are counted to the extrinsic motivation: Immediate Payoffs, Delayed Payoffs and Social Motivation. The category of *Immediate Payoffs* covers all kinds of immediately received compensations for the work on crowdsourcing tasks. Possible direct payoffs in the case of paid crowdsourcing are payments received for completing a task or winning a contest. *Delayed Payoffs* address all kind of benefits that can be used strategically to generate future material advantages. This type of motivation is measured by the constructs Signaling and Human Capital Advancement. The category of *Social Motivation* is the extrinsic counterpart of intrinsic motivation by community identification. It covers socially motivated extrinsic motivation out of values, norms and obligations from outside the platform community as well as indirect feedback from the job and the need for social contact. Table 3 shows all extrinsic constructs of the model:

		Definition	Example	Source
Imm. payoffs	Payment	Motivation by the monetary remuneration received for completing a task	A worker is active on a crowdsourcing platform as a form of primary or secondary income.	(Lakhani and Wolf, 2005)
Delayed payoffs	Signaling	Refers to the usage of actions as strategic signals to the surroundings	A worker who joins a platform or selects tasks in order to show presence and advance his chance of being noticed by possible employers.	(Lakhani and Wolf, 2005; Weiss, 1995)
	Human Capital Advancement	Refers to the motivation through the possibility to train skills that could be useful to generate future material advantages	A worker picks translation tasks because he or she wants to improve language skills for a new or better job.	
Social motivation	Action Significance by External Values	Captures the significance of an action concerning the compliance with values from outside the crowdsourcing community that is perceived by the worker when contributing to the community or working on a task	A worker joins a platform and participates because the values it stands for are important to him as well (e.g. freedom of speech).	(Deci and Ryan, 1985; Hackman and Oldham, 1980; Ryan and Deci, 2000)
	Action Significance by External Obligations & Norms	Motivation induced by a third party from outside the platform community that traces back to obligations a worker has or social norms he or she wants to comply with in order to avoid sanctions (does not include material obligations)	A student working on scientific survey tasks on a crowdsourcing platform because he is obliged to do so by his professor / tutor.	
	Indirect Feedback from the Job	Covers motivation caused by the prospect of feedback about the delivered working results by other individuals	A worker is very committed because he seeks commendation.	(Hackman/Oldham, 1980)

Table 3. Constructs of Extrinsic Motivation

SURVEY DESIGN AND DATA COLLECTION

Generally, we adapted the questions on task-related motivation from the Job Diagnostic Survey by Hackman and Oldham (1980). We took the findings of Idaszak and Drasgow (1987) into account who evaluate that only positively formulated statements should be used. For every construct, two types of questions were formulated – one that directly addresses the reader with a comprehensive and well-explained question and two statements formulated to match the positive extreme of the direct question. The two types were used to ensure a better understanding of the questions and to avoid misleading or irritation of the participants.

Measuring 13 constructs with 3 items each lead to a total of 39 survey elements concerning motivational aspects. The two question types were put on two different pages with random question order to avoid question placement bias. The demographic questions were adapted from Ross et al. (2010) and Ipeirotis (2010). The questionnaire was reviewed by five experts and revised to the final version.

We posted a task on MTurk called “Scientific survey about Mechanical Turk usage (10-15 min)” without any restrictions. Workers were then redirected to SurveyGizmo (www.surveygizmo.com) for conducting the survey that consisted of 61 questions. Due to space limitations, not all elements of the survey are described in this paper. Based on a first batch of five tasks on MTurk, a completion time of 10 to 15 minutes was estimated. We therefore paid each participant \$0.30 which is consistent with average wage level on MTurk (Horton and Chilton, 2010). The participant received a payment code that could be submitted on MTurk. 679 responses were collected from January 27th, 2011 to January 29th, 2011. We matched the survey responses with payment requests on MTurk and excluded responses that could not be allocated or were incomplete.

To filter out spammers, three “test questions” were included into the survey. As expected, the content-related question (asking for deeper understanding of the subject) was the strongest criteria and answered incorrectly by about a quarter of the participants. Including two classical test questions that were mixed into the construct questions, a total of 218 participants (33.7%) had to be classified as spammers, as they answered at least one of the test questions wrong. This led to a total of 431 valid responses. The present exclusion rate of 66.3% is well in line with the findings of research on quality control measures on MTurk (Downs, Holbrook, Sheng, and Cranor, 2010). After rejecting obvious spammers, we paid a total of \$190.08 included fees to the workers.

DATA ANALYSIS AND DISCUSSION

Demographics

Figure 2 shows the demographic distribution of the participants in our sample. It has to be pointed out that the overall distribution of demographics is very similar to those of other studies, e.g. the one of Ipeirotis (2010) or Ross et al. (2010) which is a strong indicator for the representativeness of the sample.

Construct Scores and Standardization

As a reliability test for the item combinations, Cronbach’s Alpha shows values between 0.735 and 0.938 which can be seen as satisfactory for our application. Since the data does not pass the test for normal distribution, we use only non-parametric methods for data analysis in the following. As the survey can be seen as a cross-cultural study, it potentially holds the risk of suffering from biases based on cultural differences: Acquiescent response style (ARS) refers to the general tendency to agree. Extreme response style (ERS) means the tendency to choose extreme values on rating scales (Fisher and Milfont, 2010).

A Kruskal-Wallis-Test shows significant differences between the construct ratings of participants from the three different cultures (America, India, all other countries). Indian participants were, except for the pastime score, generally rating between 1 and 2 scores higher than those from the US. This clearly indicates the presence of an ARS bias in the case of Indian participants, which is consistent with other cross-cultural scientific studies (Johnson, Kulesa, Llc, Cho, and Shavitt, 2005).

To account for these response biases, we adapt a formula by Fisher and Milfont (2010) to standardize the data. Our modified score calculation formula standardizes all other countries on the level of the deviation-standardized American mean score. This allows easier interpretation and comparison of absolute score values. ARS is addressed by creating a score that has the grand mean of the standardized American participant’s scores. Division by the standard deviation addresses ERS because the impact of extreme rating on the resulting score is damped. For more details on the standardization (which we could only describe briefly here due to space limitations), please contact the corresponding authors.

Since the focus of this paper is a general overview, we decided not to mention culture induced motivational differences in the following chapters.

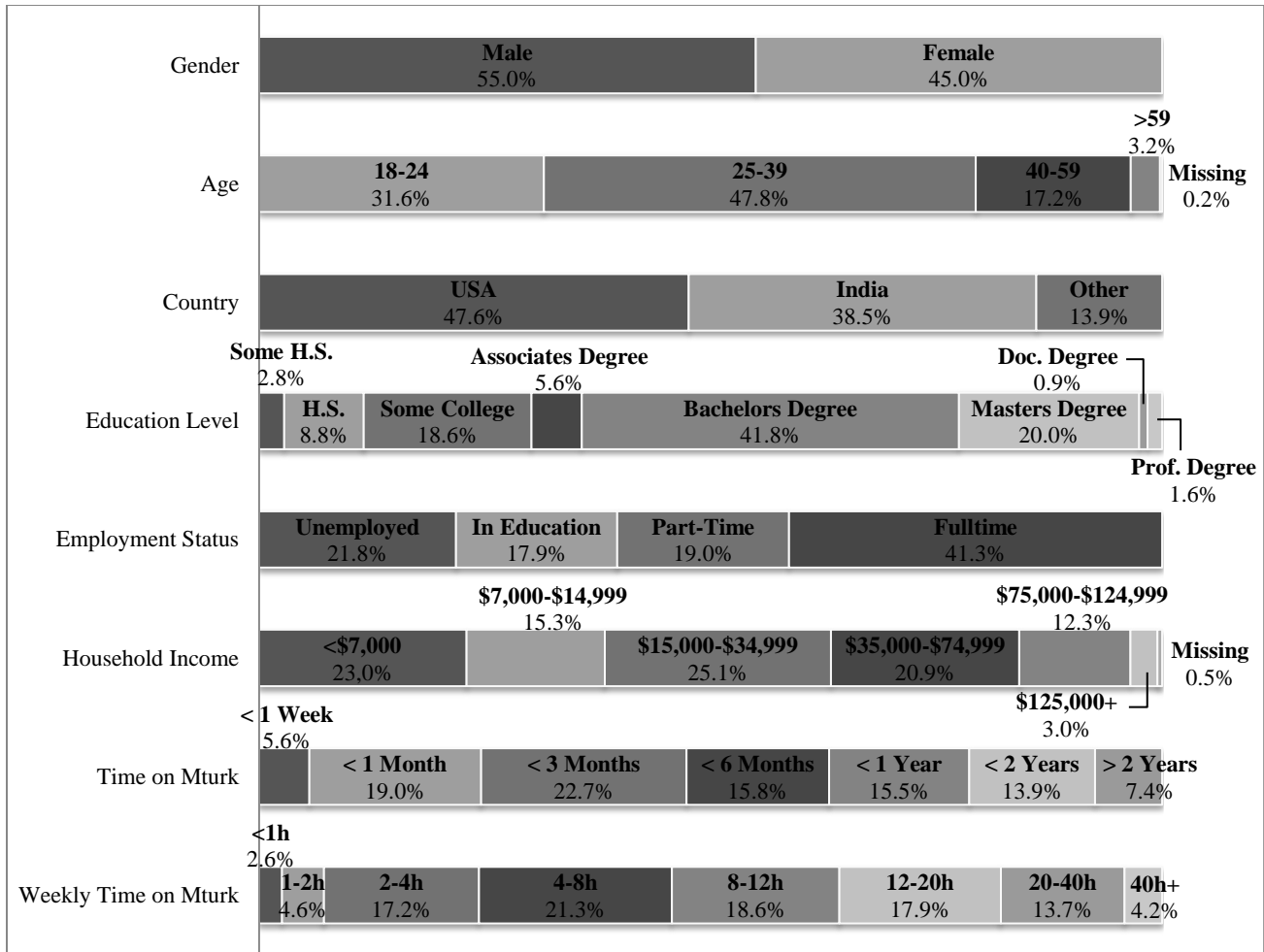


Figure 2: Demographics in our sample

General Results / Motivational Measures

Figure 3 shows an overview over the mean construct scores after standardization. Possible values range from -0.78 (an Indian selecting 1 on the Likert scale) to 3.99 (an American selecting 7). Table 4 shows key allocation data as well as the ranking of the constructs that was created using pairwise Wilcoxon signed rank tests, a nonparametric alternative to the T-test. Constructs with scores that did not significantly differ from each other were grouped.

The construct with the highest score is Payment. Bearing in mind the low payment level, this seems to be remarkable. However, a recent experiment on MTurk has shown that asking participants directly for payment-induced motivation is very likely to return values influenced by a social desirability bias (Shaw, 2010). We find further evidence when analyzing dependencies between demographics and the payment score. It seems that directly asking for payment-induced motivations delivers some kind of measure that more or less represents something like the own perceived value of money. For the other variables, we did not find evidence that suggest a similar effect. For this paper, we therefore exclude motivation by payment from further analysis.

Overall, intrinsic motivation seems to dominate its extrinsic counterpart, as the corresponding constructs are ranked higher predominantly. Especially the category Fun & Enjoyment sticks out, because all of its constructs are ranked on the upper half of the list and none of them has a score below 2.0. Surprisingly, Human Capital Advancement can be found in the same region as Task Autonomy, Skill Variety and Task Identity. This highlights the importance of all task-related factors for worker motivation.

Running additional reliability tests over the constructs of each category deliver an alpha value of only .500 for the Enjoyment Based Motivation. However, removing the most disturbing factor Pastime delivers a value of .708. This indicates that placing Pastime within this category may be misleading and it seems possible that it might be an independent value.

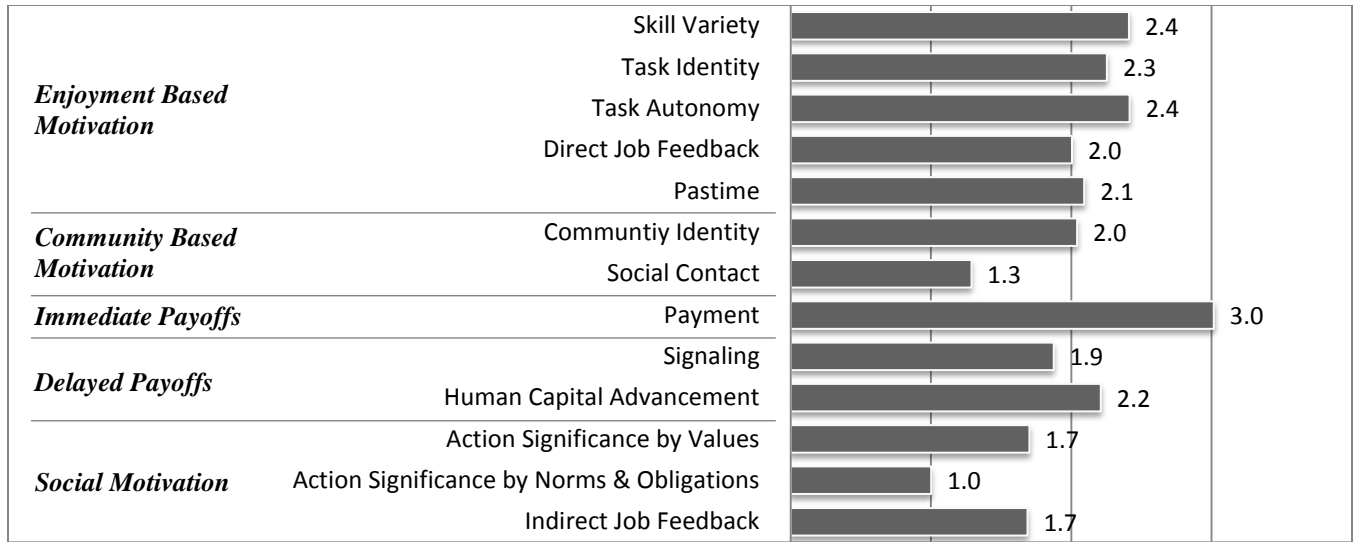


Figure 3: Mean construct scores after standardization

Rank		Valid N	Mean	Median	Std. Dev.	Min.	Max.
1	Payment	431	3.0151	3.1509	0.6912	-0.54	3.99
2	Task Autonomy	431	2.4149	2.4708	0.7787	-0.31	3.99
	Skill Variety	431	2.4111	2.4708	0.7423	0.15	3.99
4	Task Identity	431	2.2535	2.2808	0.9175	-0.78	3.99
	Human Capital Advancement	431	2.2097	2.2808	0.8282	-0.54	3.99
	Pastime	431	2.0920	2.2808	1.2143	-0.78	3.99
7	Community Identification	431	2.0407	2.0907	0.8803	-0.54	3.99
	Direct Feedback from the Job	431	2.0048	1.9960	0.7412	-0.08	3.80
9	Signaling	431	1.8743	1.9006	0.9083	-0.78	3.99
10	Action Significance by Values	431	1.7019	1.7106	0.8663	-0.78	3.99
	Indirect Feedback from the Job	431	1.6889	1.6478	0.8076	-0.78	3.80
12	Social Contact	431	1.2882	1.1404	0.9696	-0.78	3.80
13	Action Significance by Norms & Obligations	431	1.0023	0.7603	0.8324	-0.78	3.38

Table 4. Construct Statistics and Ranks

Influence of Demographics on Motivation

For determining dependencies between demographic values and motivation scores, we use correlation analysis (non-parametric Kendall-Tau Rank correlation coefficient) and pairwise comparisons for stochastic domination (normality-independent Mann-Whitney U test). All mentioned significances are 2-tailed and asymptotic and are based on a confidence interval of 5%. The absolute values of the correlation coefficients are not interpreted further because of their dependence on the individual variable’s coding. Due to space limitations and the large number of statistically significant effects we identify, we have to limit the description to those we perceive most interesting.

Overall, we find a large number of easily explainable and somehow ‘natural’ dependencies between the demographics and the motivational scores. For example, we notice that participants stating to be still in education rank Skill Variety and Social Contact significantly lower than those in all other subgroups of employment status. Additionally, participants working part-

time rate Human Capital Advancement significantly higher than those in education or working fulltime. Furthermore, the overall importance of Social Contact is low but women rate it significantly higher.

Some interesting dependencies could be noticed concerning the pastime score: We find a highly significant positive correlation (.227) with the annual household income. This indicates that it might be suitable as an estimator for the individual importance of the motivation by payment. Additionally, we observe a highly significant negative correlation (-.195) between Pastime and Weekly Time on MTurk, indicating that ‘killing time’ only induces occasional worker on the platform. This shows that workers using MTurk for ‘killing time’ do not tend to use it very frequently.

Additionally, Weekly Time on MTurk is also positively correlated with 9 of the other 12 motivational construct scores (all highly significant). The strongest and most interesting correlations concern Signaling ($\tau=.240$; mean group score ranging from 1.17 to 2.45), Community Identification ($\tau=.212$; 1.36 to 2.53), Human Capital Advancement ($\tau=.210$; 1.69 and 2.65), Indirect Feedback ($\tau=.201$; 0.96 to 2.12), and Skill Variety ($\tau=.182$; 1.92 to 2.64). This may imply that the motivation of ‘power-workers’ is highly different from the motivation of ‘occasional’ workers. The mean score distributions of these variables are displayed in Figure 4. Noticeable effects could be the generally higher motivational level of the ‘power-workers’ as well as the comparably stronger importance of Human Capital Advancement, Signaling and Community Identification in relation to Skill Variety. The overall influence of weekly time on MTurk qualifies this variable as a possible dependent variable in a structural model. The anomalous values for “Less than 1 hour per week” can be explained by small sample size (N=11) or inexperience of the participants.

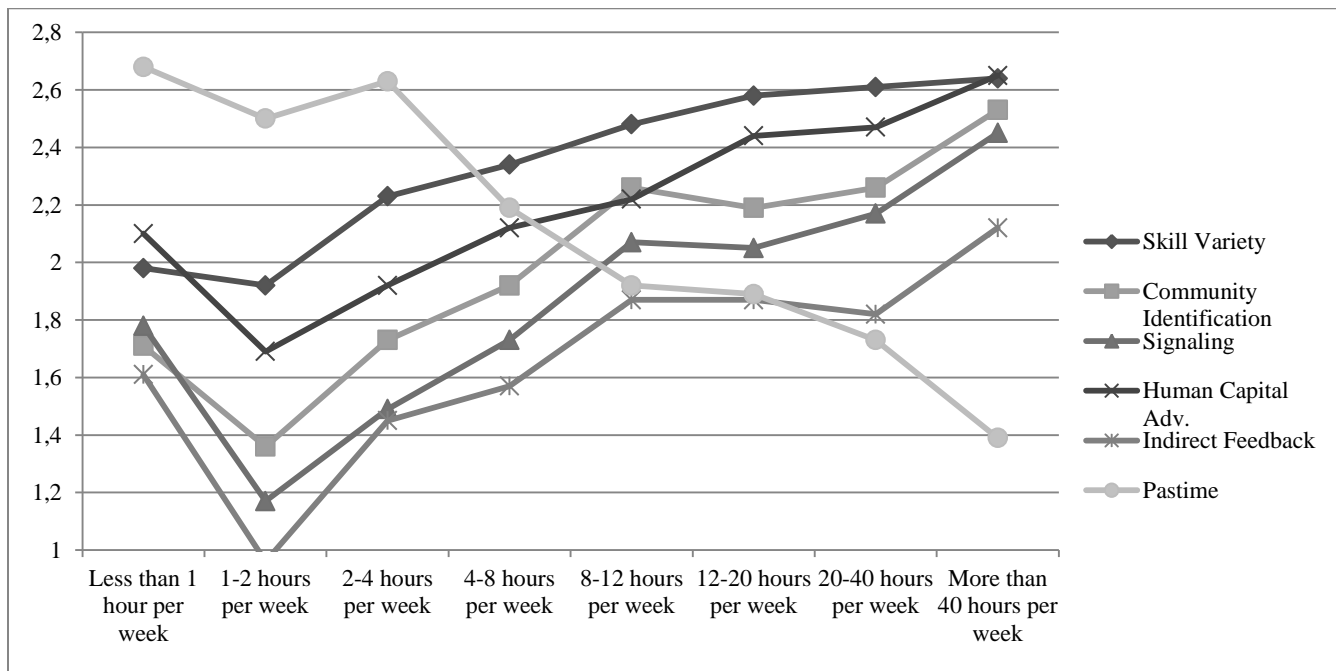


Figure 4: Mean construct score distribution over Weekly Time on MTurk

CONCLUSION AND FUTURE WORK

A general model for the motivation of workers in paid crowdsourcing environments is a prerequisite for many further research directions in that area. However, most of the existing literature focuses on special application fields or is not sufficiently grounded by theory. We therefore adapt existing literature from classic motivation theory, work motivation theory, and open source software. The developed model for worker’s motivation in crowdsourcing environments is clearly separated by intrinsic and extrinsic motivation and structured in the five motivation categories Enjoyment Based Motivation, Community Based Motivation, Immediate Payoffs, Delayed Payoffs, and Social Motivation.

A test of the model via a survey with 431 workers on the crowdsourcing platform Amazon Mechanical Turk shows a good mixture of expected and logical but also interesting and insightful results. It can be concluded that the usability of the model seems to be confirmed in the case of MTurk. Many intrinsic motivation factors seem to dominate the extrinsic ones. Task related factors play a major role in the continuum of factors that motivate the workers which includes the usage of a variety of skills, deciding on the own how to solve a task or the “feasibility” of work results. Surprisingly, this list also and explicitly

includes the (extrinsic) motivation to work on tasks to learn new or train existing skills, which related literature has not perceived to be that important yet.

In a next step, we will apply the model to different crowdsourcing platforms in different domains for further validation and comparison of motivation scores for the different aspects of extrinsic and intrinsic motivation. While it would be interesting to develop and test a conceptual model based on the findings, it has to be evaluated if a platform independent conceptual model of crowdsourcing motivation is reasonable; or if the motivation on idea competitions is clearly different from microtask-platforms and open source development. Since our data suggest that the motivation is significantly different between ‘power-workers’ and occasional workers, the (weekly) work time on crowdsourcing platforms could be a good dependent variable for a structural model.

An interesting research question is the connection between properties of tasks and platforms and the resulting motivation; and how the motivation can be influenced or triggered by design choices the crowdsourcing requesters has, e.g. how a task has to be designed in a way to motivate only specific groups of workers. The research on the difference in results based on workers motivation is also just in the beginning. The question whether there is a link between motivation and quality and how workers can be motivated to contribute better results is very promising. Our results further suggest a high potential for community induced intrinsic motivation (even external communities in the case of Mechanical Turk and Turkernation). Further research has to show if and in which cases a community can have negative influence on results; or if there can be a reason for platform providers not to offer community functionality.

Though the offered payment is considered most important by many of the workers, the collected data provides multiple indications for the presence a social desirability bias. It becomes clear that asking for the importance of money directly has to be considered as non-objective. Therefore, a better method for measuring the importance of money has to be developed. Approaches like list experiments (Shaw, 2010) or natural experiments (Mason and Watts, 2009) could be promising approaches. The data from our survey suggest that there might be a link between pastime and payment (negative correlation). Additional research has to show if this perception of crowdsourcing as a time filler in times of boredom can be a better measure for the importance of payment. The collected data showed effects that may hint to use the measured “pastime” motivation as an estimator instead, whereby a negative dependency should be presumed. This assumption is supported by the fact that the data suggests the placement of pastime in the category of enjoyment based motivation may be wrong.

REFERENCES

1. Brabham, D. C. (2008) Moving the crowd at iStockphoto: The composition of the crowd and motivations for participation in a crowdsourcing application, *First Monday*, 13, 6, 1-22.
2. Brabham, D. C. (2010) Moving the crowd at Threadless: Motivations for participation in a crowdsourcing application, *Information, Communication & Society*, 13, 8, 1122-1145.
3. Deci, E. L., and Ryan, R. M. (1985) Intrinsic motivation and self-determination in human behavior, Springer.
4. Downs, J. S., Holbrook, M. B., Sheng, S., and Cranor, L. F. (2010) Are your participants gaming the system?, In *Proceedings of the 28th international conference on Human factors in computing systems - CHI '10*, Atlanta, Georgia, USA, 2399.
5. Fisher, R., and Milfont, T. L. (2010) Standardization in psychological research, *International Journal of Psychological Research*, 3, 2, 88-96.
6. Hackman, J., and Oldham, G. R. (1980) Work redesign, Addison-Wesley, Reading Mass.
7. Hertel, G., Niedner, S., and Herrmann, S. (2003) Motivation of software developers in Open Source projects: an Internet-based survey of contributors to the Linux kernel, *Research Policy*, 32, 7, 1159-1177.
8. Horton, J., and Chilton, L. B. (2010) The labor economics of paid crowdsourcing, In *Proceedings of the 11th ACM conference on Electronic commerce*, Cambridge, Massachusetts, USA: ACM, 209-218.
9. Howe, J. (2006) The Rise of Crowdsourcing, *Wired*, 14, 6.
10. Idaszak, J. R., and Drasgow, F. (1987) A Revision of the Job Diagnostic Survey: Elimination of a Measurement Artifact, *Journal of Applied Psychology*, 72, 1, 69-74.
11. Ipeirotis, P. G. (2010) Demographics of Mechanical Turk, Working Paper.
12. Johnson, T., Kulesa, P., Llc, I., Cho, Y. I., and Shavitt, S. (2005) The Relation Between Culture and Response Styles, *Journal of Cross-Cultural Psychology*, 36, 2, 264 -277.

13. Kleemann, F., Voß, G., and Rieder, K. (2008) Crowdsourcing und der Arbeitende Konsument, *Arbeits- und Industriegesellschaftliche Studien*, 1, 1, 29-44.
14. Lakhani, K. R., and Wolf, R. G. (2005) Why hackers do what they do: Understanding motivation and effort in free/open source software projects, In *Perspectives on free and open source software*, MIT Press.
15. Leimeister, J., Huber, M., Bretschneider, U., and Krcmar, H. (2009) Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition, *Journal of Management Information Systems*, 26, 197–224.
16. Lerner, J., and Tirole, J. (2002) Some Simple Economics of Open Source, *The Journal of Industrial Economics*, 50, 2, 197-234.
17. Lindenberg, S. (2001) Intrinsic Motivation in a New Light, *Kyklos*, 54, 2&3, 317-342.
18. Mason, W., and Watts, D. J. (2009) Financial incentives and the "performance of crowds", In *Proceedings of the ACM SIGKDD Workshop on Human Computation - HCOMP '09*, Paris, France.
19. Organisciak, P. (2008) Motivation of Crowds: The Incentives That Make Crowdsourcing Work « Crowdstorming, *Crowdstorming*.
20. Osterloh, M., Rota, S., and Kuster, B. (2002) Open Source Software Production: Climbing on the Shoulders of Giants, Working Paper.
21. Roberts, J. A., Hann, I., and Slaughter, S. A. (2006) Understanding the Motivations, Participation, and Performance of Open Source Software Developers: A Longitudinal Study of the Apache Projects, *MANAGEMENT SCIENCE*, 52, 7, 984-999.
22. Ross, J., Irani, L., Silberman, M. S., Zaldivar, A., and Tomlinson, B. (2010) Who are the crowdworkers?: shifting demographics in mechanical turk, In *Proceedings of the 28th of the international conference extended abstracts on Human factors in computing systems*, Atlanta, Georgia, USA: ACM, pp. 2863-2872.
23. Ryan, R. M., and Deci, E. L. (2000) Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions, *Contemporary Educational Psychology*, 25, 1, 54-67.
24. Schroer, J., and Hertel, G. (2009) Voluntary Engagement in an Open Web-Based Encyclopedia: Wikipedians and Why They Do It, *Media Psychology*, 12, 1, 96-120.
25. Shaw, A. (2010) The CrowdFlower Blog - For love or for money? A list experiment on the motivations behind crowdsourcing work, <http://blog.crowdfunder.com/2010/08/for-love-or-for-money-a-list-experiment-on-the-motivations-behind-crowdsourcing-work/#more-931>.
26. Weiss, A. (1995) Human Capital vs. Signalling Explanations of Wages, *Journal of Economic Perspectives*, 9, 4, 133-54.