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Overvie the Technology Acceptance Model: Origins, velopments and Future Directions

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Abstract
User acceptance of technology has been an important field of study for over two decades now. Although many models have been proposed to explain and predict the use of a system, the Technology Acceptance Model has been the only one which has captured the most attention of the Information Systems community. Thus, it is essential for anyone willing to study user acceptance of technology to have an understanding of the Technology Acceptance Model. This paper provides a historical overview of the Technology Acceptance Model (TAM) by summarizing the evolution of TAM, its key applications, extensions, limitations, and criticisms from a selective list of published articles on the model. Current observations indicate that although TAM is a highly cited model, researchers share mixed opinions regarding its theoretical assumptions, and practical effectiveness. It is concluded that research in TAM lacks sufficient rigor and relevance that would make it a well established theory for the IS community.

Keywords: Technology Acceptance, Information System Deployment, TAM, Information System Theory.

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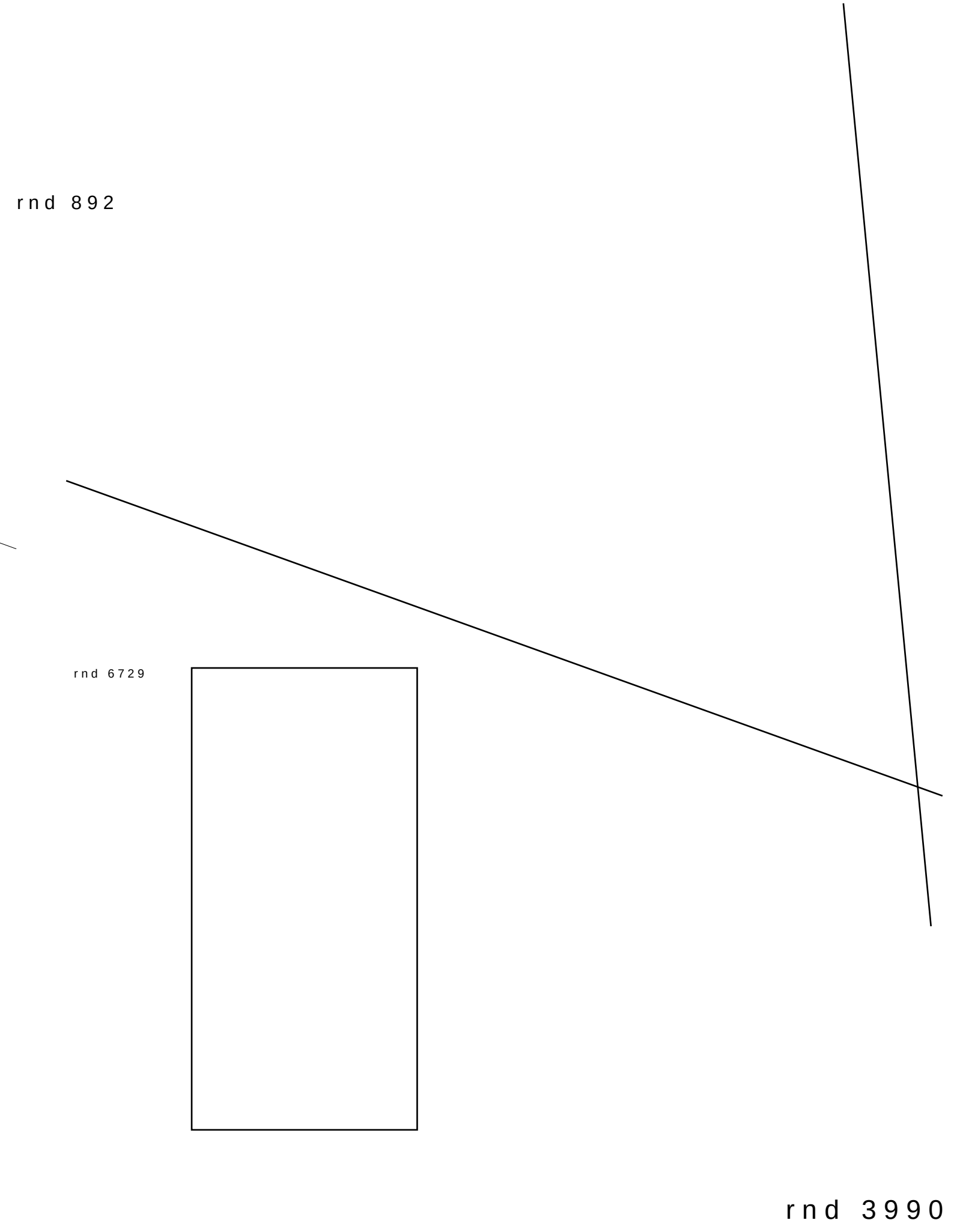
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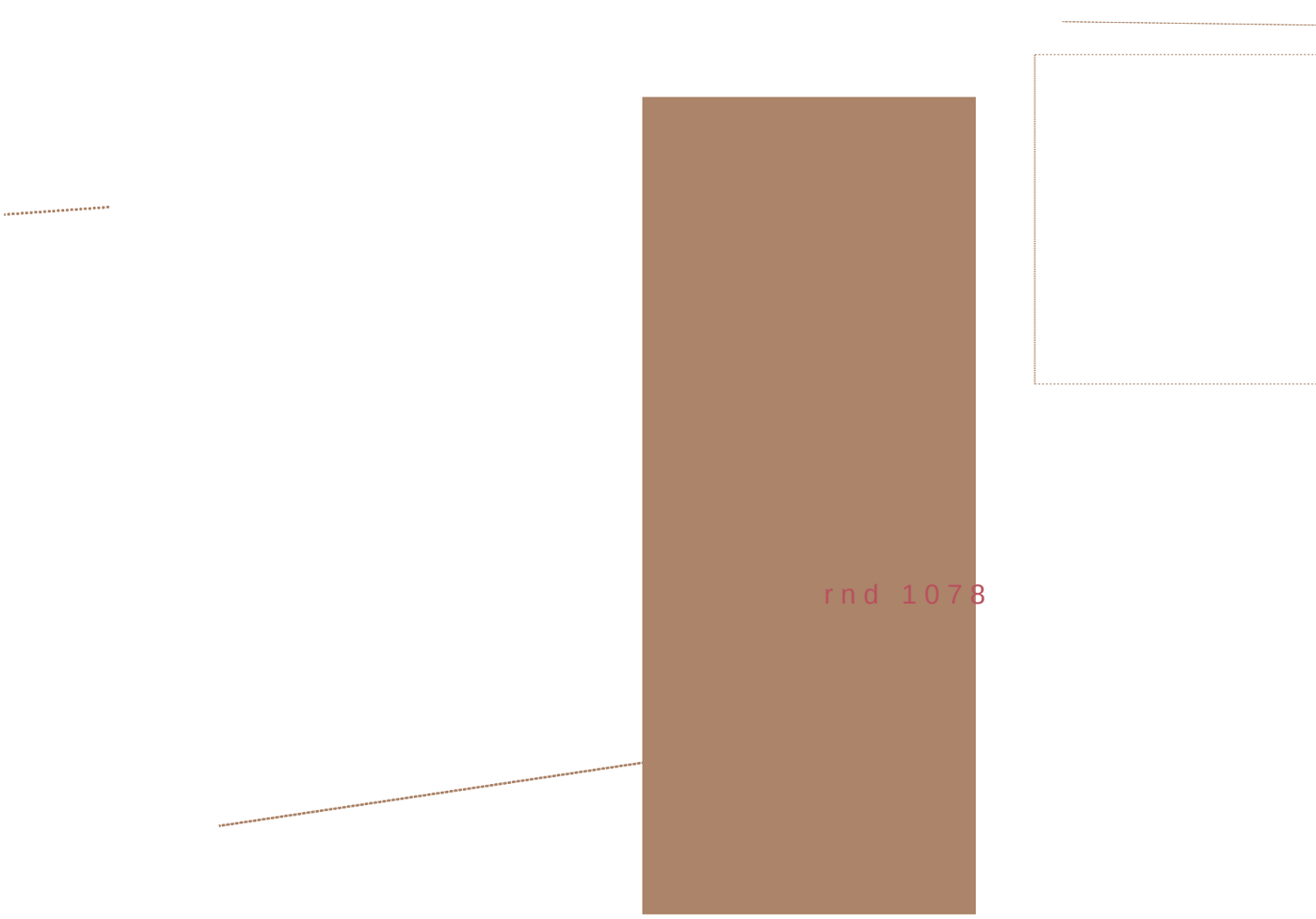
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model and adapted it to the context of user acceptance of an information system, in order to develop the Technology Acceptance Model. Davis considered that the actual use of a system is a behavior and thus, the Theory of Reason Action would be a suitable model to explain and predict that behavior. Davis however, made two main changes to the Theory of Reasoned Action (TRA) model. Firstly, he did not take subjective norm into account in predicting the actual behavior of a person. He suggested that Fishbein and Ajzen (1975) themselves acknowledged that subjective norm was the least understood aspect of TRA, and that it had uncertain theoretical status. Thus, Davis (1985) only considered the attitude of a person towards a given behavior in his TAM model. Secondly, instead of considering several individual salient beliefs to determine the attitude towards a given behavior, Davis (1985) relied on several other related studies to identify only two distinct beliefs, perceived usefulness and perceived ease of use, that were sufficient enough to predict the attitude of a user toward the use of a system.

Related studies on percei

Prior to the work of Davis
perceived ease of use and
extensive review of these s
them are described.

Schultz and Slevin (1975), for instance, carried out an exploratory study, and found that perceived usefulness provided a reliable prediction for self-predicted use of a decision model. Robey (1979) later replicated the work of Schultz and Slevin (1975), and confirmed the high correlation that existed between perceived usefulness and system usage. On the other hand, support for the importance of perceived ease could be found in the meta-analysis of Tornatzky and Klein's (1982) on innovation adoption. Tornatzky and Klein studied the relationship between the characteristics of an innovation and its adoption, and found that the complexity of an innovation was one of the three factors that had the most consistent significant relationships among a wide range of innovation types.

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Bandura (1982) further, showed the importance of considering both perceived ease of use and perceived usefulness in predicting behavior. He suggested that in any given instance, behavior would be best predicted by both, self-efficacy and, outcome judgments. Self-efficacy, which was similar to perceived ease of use, was defined as judgments of how well one can execute courses of action required to deal with prospective situations, whereas outcome judgment, which was similar to perceived usefulness, was defined as the extent to which a behavior once successfully executed is believed to be linked to valued outcomes.

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Table 2

Initial scale items for perceived ease of use (Davis, 1989, p. 324)

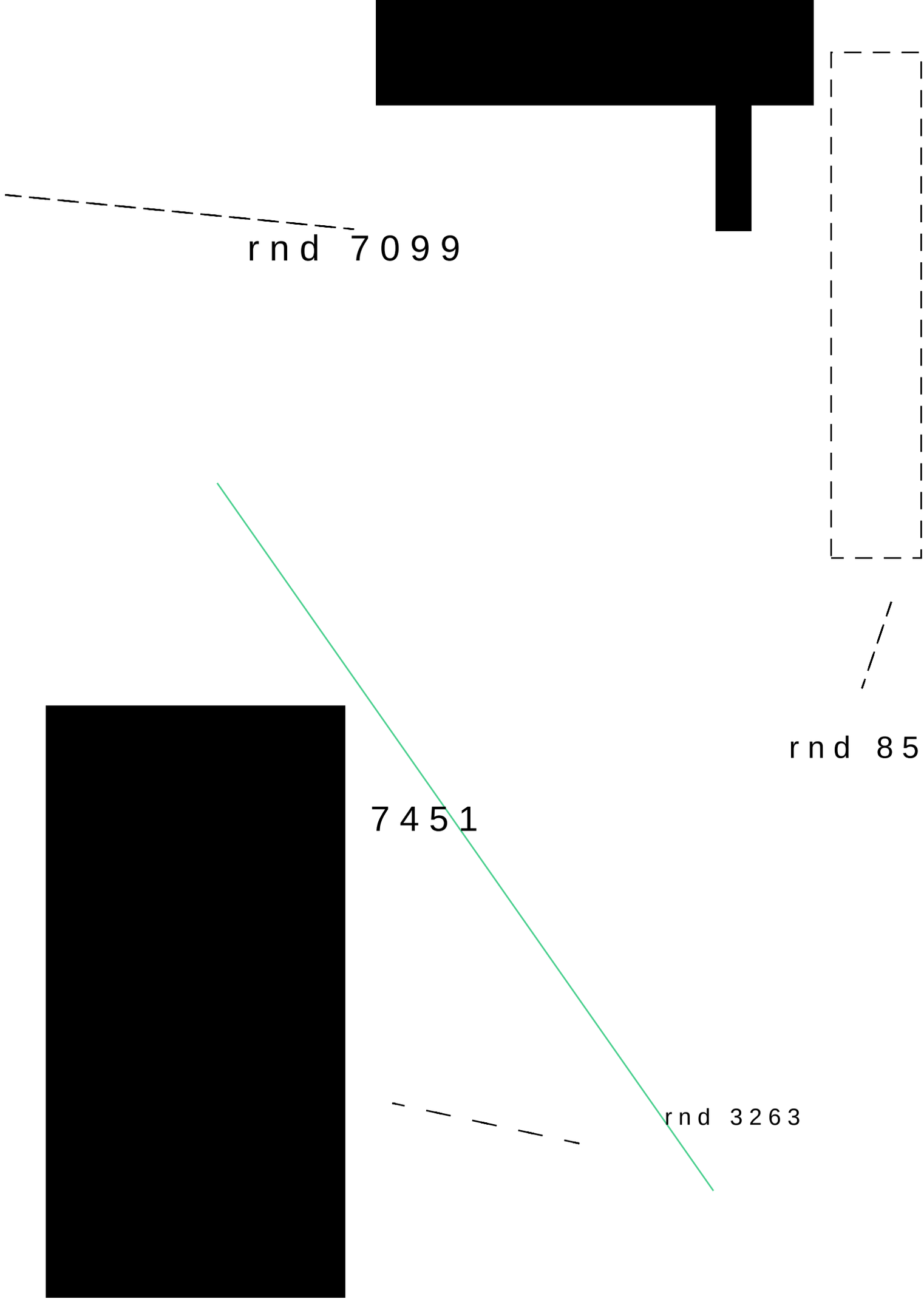
Item No.	Candidate item for measuring perceived ease of use
1	I often become confused when I use the electronic mail system.
2	I make errors frequently when using electronic mail.
3	Interacting with the electronic mail system is often frustrating.
4	I need to consult the user manual often when using electronic mail.
5	Interacting with the electronic mail system requires a lot of my mental effort.
6	I find it easy to recover from errors encountered while using electronic mail.
7	The electronic mail system is rigid and inflexible to interact with.
8	I find it easy to get the electronic mail system to do what I want it to do.
9	The electronic mail system often behaves in unexpected ways.
10	I find it cumbersome to use the electronic mail system.
11	My interaction with the electronic mail system is easy for me to understand.
12	It is easy for me to remember how to perform tasks using the electronic mail system.
13	The electronic mail system provides helpful guidance in performing tasks.
14	Overall, I find the electronic mail system easy to use.

The pretest phase assessed the semantic content of the items, and categorized them in clusters of similarities such that, items that were free from ambiguity, and accurate enough to measure either perceived ease of use or perceived usefulness were easily identified. Consequently, some items that did not cluster with other items were eliminated, and some of the existing remaining ones were rephrased to produce a ten item scale as shown in Tables 3 and 4.

Table 3

d 10 item scale for perceived usefulness (Davis, 1989, Table 3, p. 326)

o.	Candidate item for psychometric measures for perceived usefulness
	Using electronic mail improves the quality of the work I do.
2	Using electronic mail gives me greater control over my work.
3	quickly.
4	
5	
6	
7	work than would otherwise be possible.
8	Using electronic mail enhances my effectiveness on the job.
9	Using electronic mail makes it easier to do my job.
10	Overall, I find the electronic mail system useful in my job.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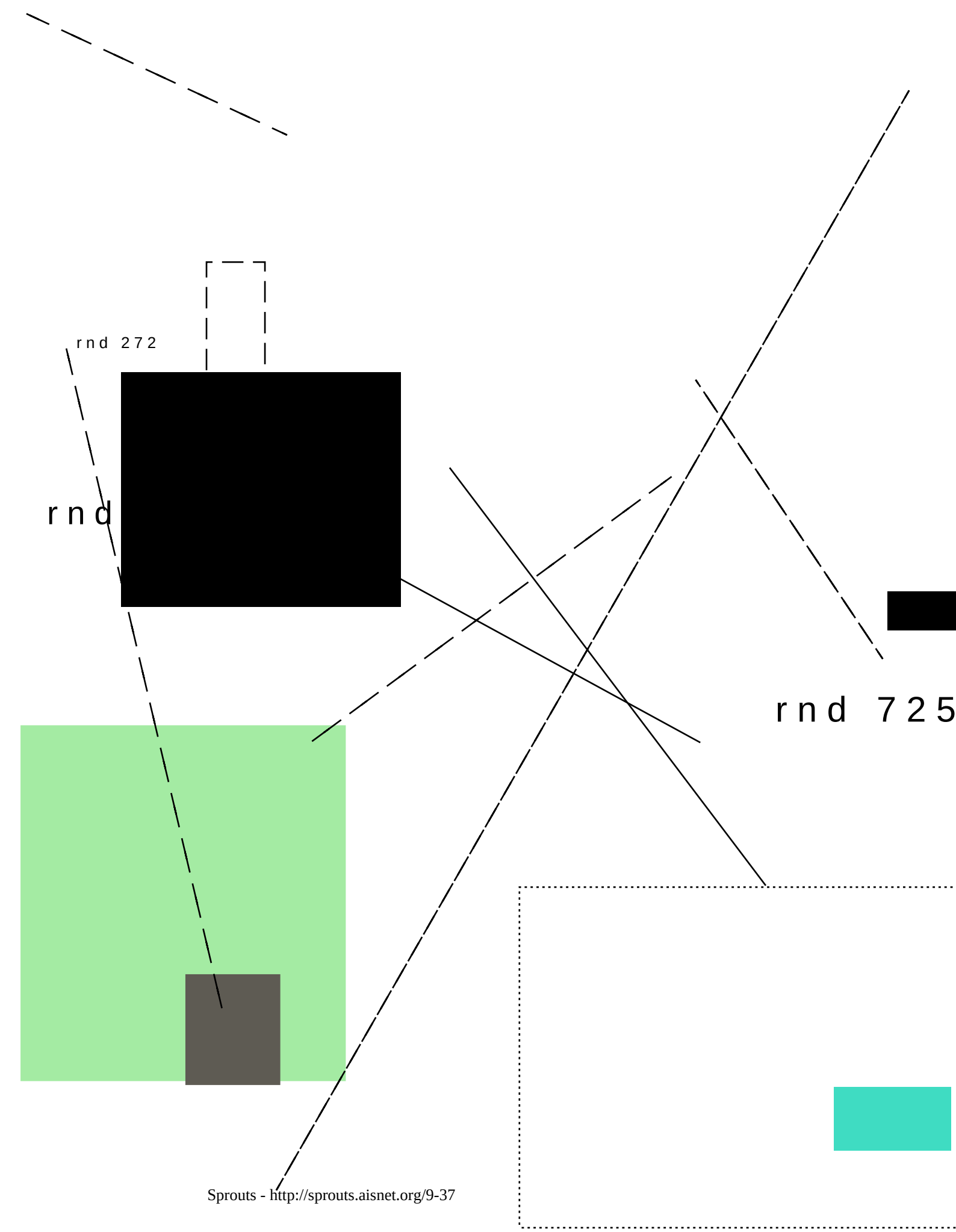
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> Assuming CHART-MASTER would be available on my job, I predict that I will use it on a regular basis in the future.

Participants had to respond to the above question by rating their predicted use of the system on two seven-point scales, one with likely-unlikely end-point adjectives, the other, with improbable-probable endpoint adjectives.

By analyzing the results obtained in his experiment, Davis (1985) found a positive correlation between the scales and self-predicted future usage. Furthermore, Davis used regression analysis to determine the relationships that existed in his TAM model. Along with the confirmation of his initial hypothesis, Davis would also discover other relationships that he had expected to be insignificant as shown in Figure 4.

Davis (1993) thus, suggested that in contrast to what he initially predicted, perceived usefulness could also have a direct influence on actual system use. At the same time, found that system characteristics could directly influence the attitude of a pers toward using the system, without the need for the person to form an actual belief abo the system as shown in Figure 4.

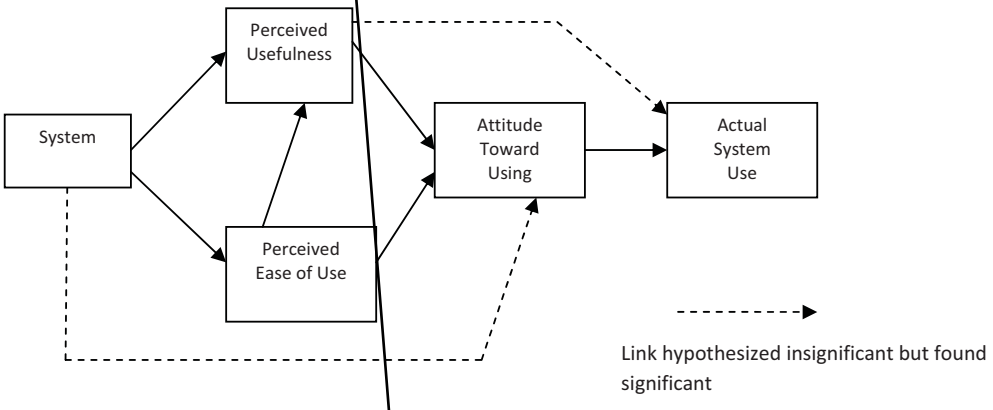
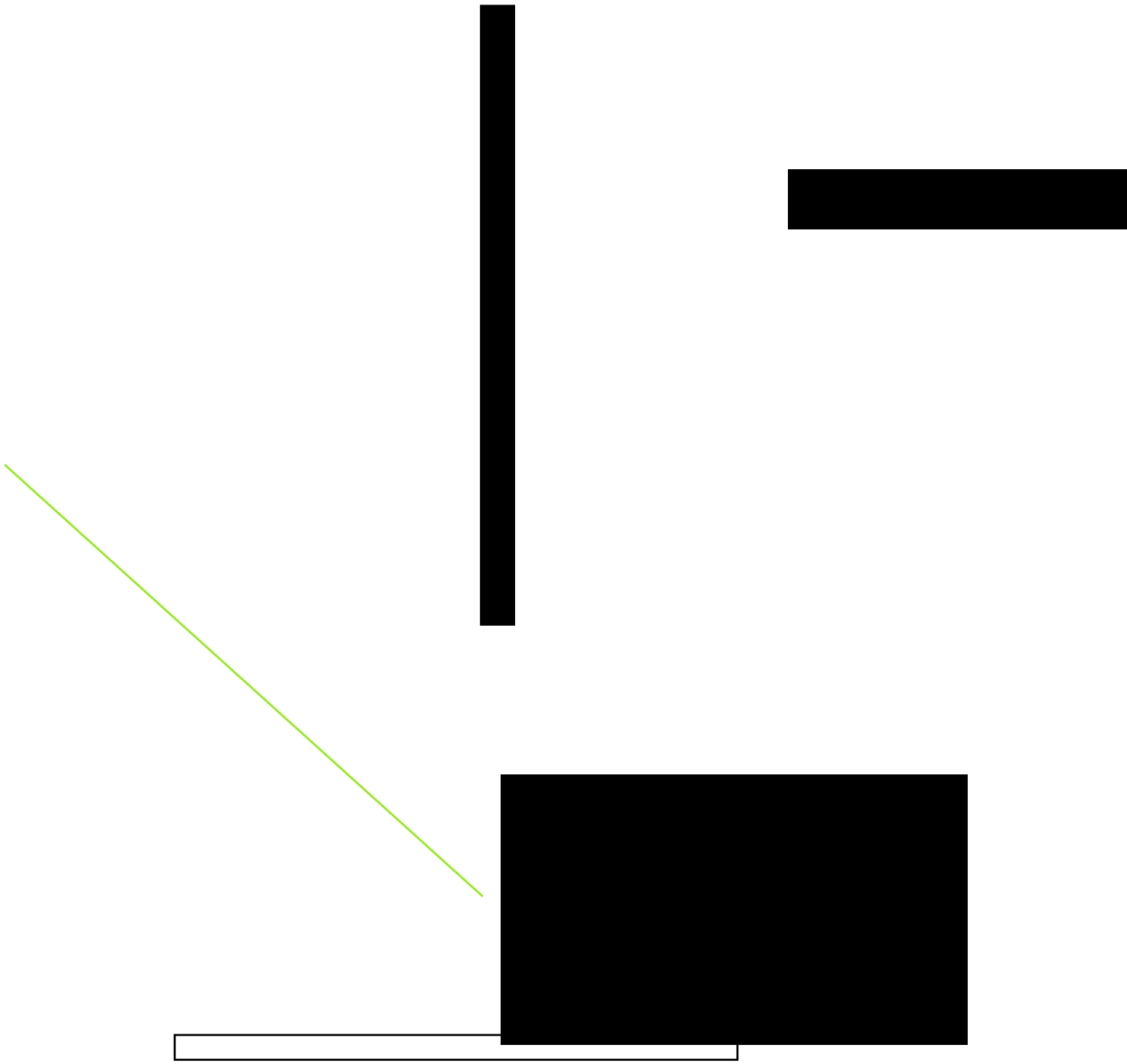


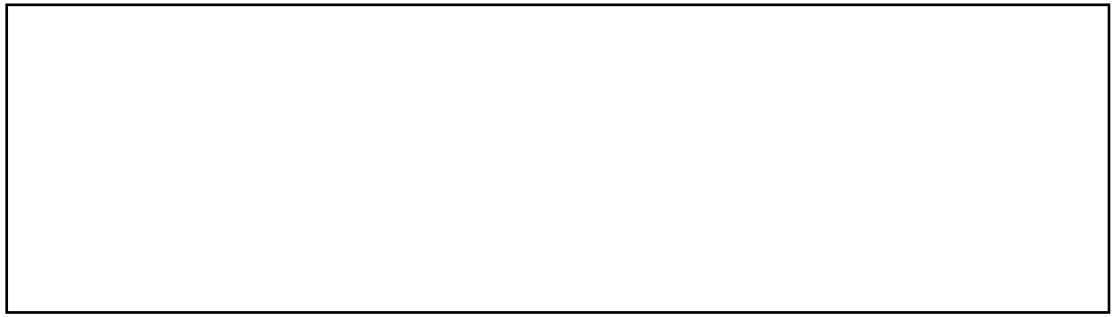
Figure 4: New relationship formulation in TAM (Davis, 1993, p. 481).

Consequently, several other studies followed in order to investigate in depth the relationships between the different variables in the TAM model.

TAM evolving

Later development of TAM would include behavioral intention as a new variable that would be directly influenced by the perceived usefulness of a system (Davis, Bagozzi and Warshaw, 1989). Davis et al. (1989) suggested given a system which was perceived useful, an behavioral intention to use the system without formi a modified version of the TAM model as illustrated in





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However, compared to the TAM model, the Theory of Planned Behavior (TPB) m provided more details that explained the intention of the participants to use spreadsheet application. This is because TPB being a more complex model had sev independent variables that could capture vari example, as shown in Figure 7, the perceived identify specific barriers to system use such a the model also could identify groups whose op through the subjective norms construct. M Behavior model considered only beliefs that accurate information could be obtained. TAM i generally applied to any system, and thus perceived ease of use and perceived usefulness Yet, due to its simplicity and ease of impleme than either the Theory of Reasoned Action or efforts later concentrated on either applying TA to include more variables.

Adapting and extending TAM

With more than 700 citations to his original p 1989) has been adapted and extended in man attempts to consolidate the results obtained fr by Yousafzai, Foxall, and Pallister (2007) w published on TAM. Earlier meta-analysis studie He (2006), Ma and Liu (2004), Lee, Kozar and Collerette (2003). Table 7 highlights some countries, and settings for which TAM was used

Table 7

Applications, participants, country and setting used for applying TAM (Yousafzai et al., 2007), Sharp, 2006, King et al., 2006, Ma et al., 2004, Lee et al., 2003, and, Legris et al., 2003)

Variation in TAM application	Examples
Applications	Email, voicemail, fax, dial-up system, e-commerce application, groupware, word processor, spreadsheet, presentation software, database program, case tools, hospital IS, Decision support system, Expert support system, and telemedicine technology.
Country	USA, UK, Taiwan, Hong Kong, Switzerland, Japan, Australia, Turkey, Canada, Kuweit, Nigeria, France, Singapore, China, and Finland.
Type of Study	Lab study, Field study and Web surveys
Participants	Students (undergraduate and graduates), knowledge workers, physicians, bank managers, programmer analysts, IT vendor specialists, computer programmers, internet users, brokers, and sales assistants.

Most of these studies found significant statistical result for the high influence of perceived usefulness on behavioral intention to use a specific system. They also found mixed results for the direct relationship between perceived ease of use and usage

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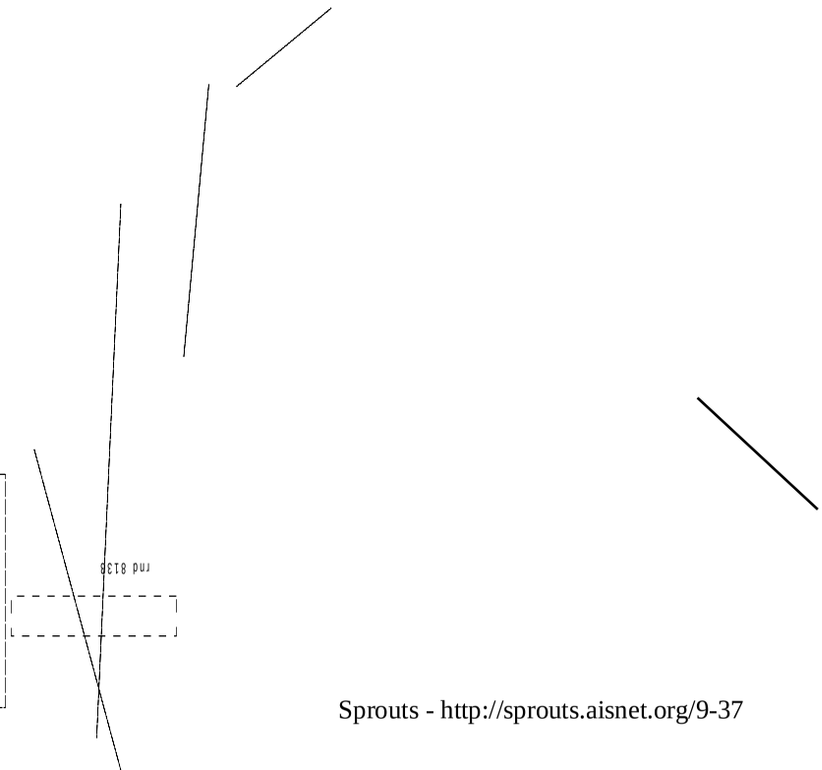
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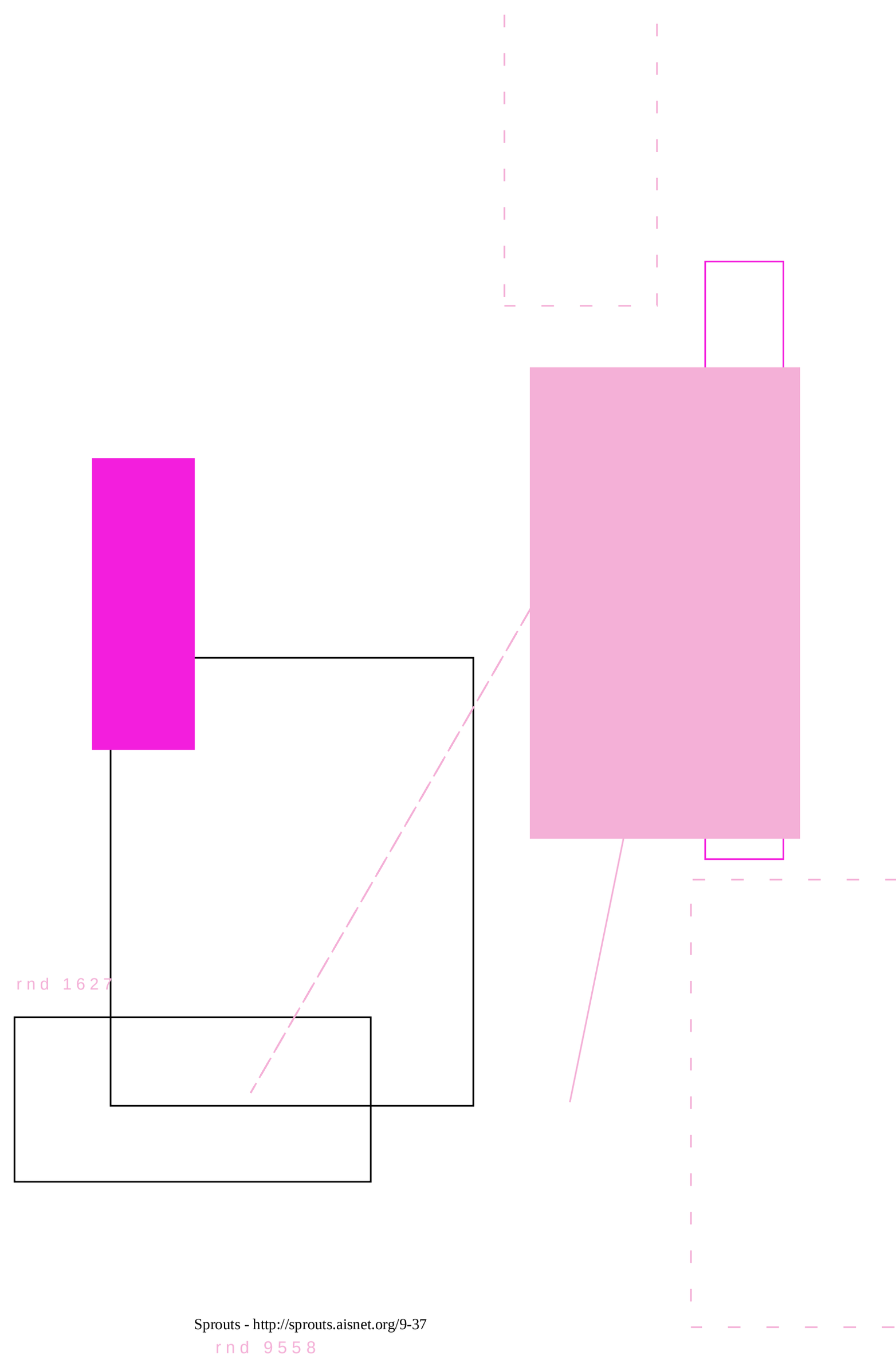
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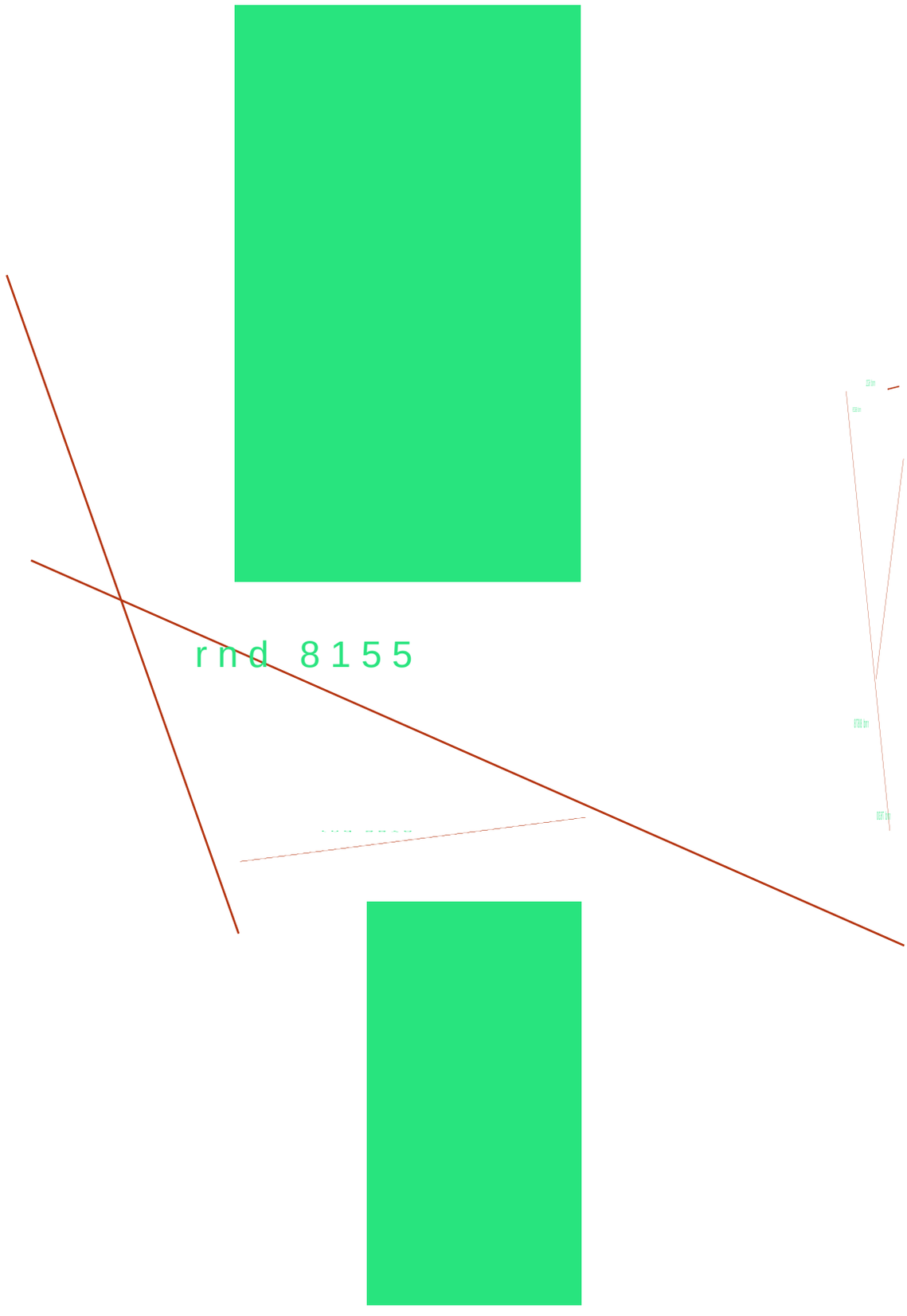
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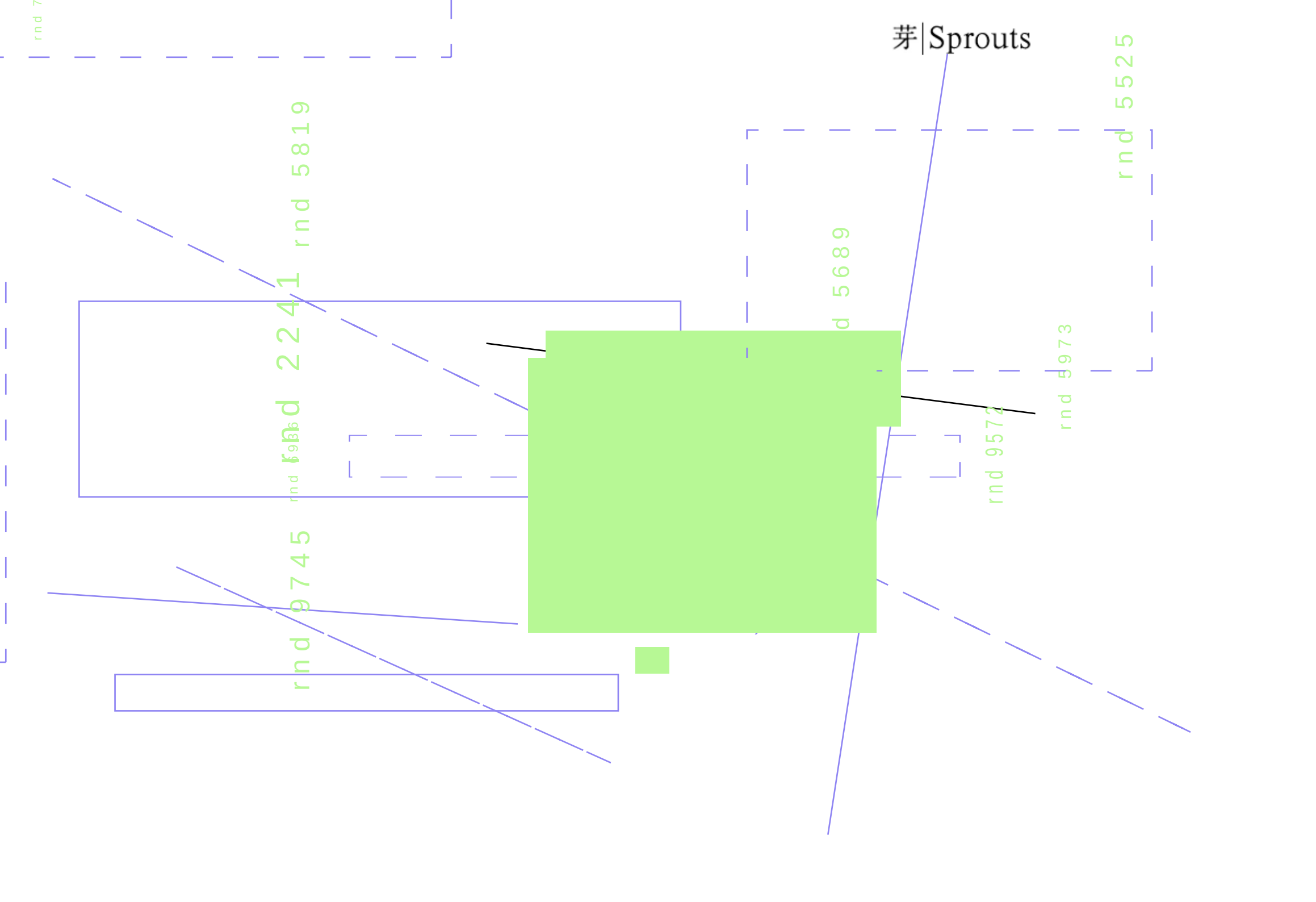
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