Gestalt Analysis of Curiosity Gap Exploitation for YouTube Thumbnail Design

Will Dunklin

Introduction:

In the increasingly digital-media-centric world, many educators, essayists, political groups, individual creators, and more have sought to expand their effective reach by creating content online. Few online mediums capture more attention than video and few sites capture more video watch time than YouTube. The common challenge in maximizing reach is how to drive a large set of viewers to click on or engage with the video. Video producers only have a certain level of control over the elements that contribute to the growth of views. Prior research has studied discrete metrics such as the effects of a video title on views, but little has been done studying the interaction between these video elements. In this research, we will examine those interactions by defining the collection of visual video elements as Thumbnail Units (TUs), analyzing those components through an extension of the theoretical framework of Gestalt theory, and by analyzing the effects of curiosity gap exploitation within this context.

The paper is broken into the following sections. Section 2 is an analysis of extant research, Section 3a, an analysis of click-through-rate (CTR) and other meaningful metrics specific to the YouTube site. Section 3b defines the specification of the thumbnail unit (TU). Section 3c extends principles of Gestalt theory to an informational context. Section 3d contains a brief analysis of CTR and a deeper analysis of TU components through the lens of informational Gestalt principles. Section 4 explores the application of information gaps to TU design and the spectrum of curiosity gap exploitation.

2. Literature Review:

The relationships between environmental variables and YouTube video performance have been studied extensively. Tafesse *et al.* (2020) focused on correlating sentiment analysis of video titles and informational analysis of other video metadata to video views. The findings showed these correlations were significant and exposed many control variables that displayed further significant correlations. Other analyses have been done focusing on audio, visual, and textual features within videos (Veluda *et al.*, 2017), emotional sentiment of videos (Nelson-Field *et al.*, 2013), and the impact of preexisting views on view growth (Zhou *et al.*, 2016). What many of these studies lack is a unified perspective for video marketers and designers to apply. This research hopes to view growth from the thumbnail unit-level, combining the works of prior research and applying them to a unified, controllable design analysis framework.

The theoretical framework we will employ to analyze thumbnail units is the Gestalt theory of design (Arnheim, 1969). Additionally, we will be using the findings from Keyes (1993) which analyzes visual and typographic hierarchy in the creation of perceptual saliency. Tepper et al. (2014) applies Gestalt elements to this visual saliency.

The unifying theory of the design framework revolves around the creation of curiosity gaps (Loewenstein, 1994) within thumbnail units. Scott (2021) shows how the creation of curiosity gaps drives viewer engagement with material and shows how modern "clickbait" can be represented as an over-exploitation of such curiosity gaps. Our research hypothesizes that applying Gestalt principles of design to invoke salient curiosity gaps creates tactical and strategic design patterns that thumbnail unit designers can utilize to affect viewer click-through rate.

3 Analysis:

3a. Click-through Rate

The process of gaining views is often the goal for most creators posting video content to YouTube. Creators desire control over the factors that increase views and will often go to great lengths to maximize the efficacy of their videos' outward appearance (Muller, 2021). The process for gaining views is far from trivial, however, and as extant research has shown views come from a varied set of sources (Zhou *et al.*, 2010). The process a video must go through for a view to happen is as follows. First, a YouTube user must click on the video. A video's efficacy at capturing these clicks is quantified through the *click-through-rate* (CTR) metric. CTR is defined as the percentage of users that click the video once the video is presented to them.

Secondly, for a user to click a video, YouTube must serve the video to be displayed to said user. Whether a user has seen a video option displayed in what is quantified through an impression. YouTube defines impressions to be when "the thumbnail is shown for more than 1 second and at least 50% of the thumbnail is visible on the screen" (*"Check your impressions and click-through rate - YouTube Help."* Google Support, 2021). There are many avenues that YouTube displays videos to users: Browse features, Suggested videos, YouTube search, Channel pages, and Others (*"Understand your video reach - YouTube Help."* Google Support, 2021). Of these enumerated methods, browse features and Suggested videos together comprise over 70% of traffic and are both controlled by YouTube's search and discovery algorithm (Solsman, 2018). The algorithmic selection of a set of videos is predicated on variables such as video watch-time, the CTR metric, and many other metadata, however, this algorithm is ultimately an unviewable black box controlled by YouTube. The optimal arguments for the search and discovery algorithm have been known to shift over time, and, as the algorithm is proprietary closed-source software, are impossible to rigorously solve.

Views can be thought of as the result of combining the above factors, impressions, and CTR. For this research, we will solely focus on CTR as impressions are reliant on ever-changing, unknowable external factors. Additionally, CTR is derived from the appearance and presentation of a video--what the video creator has the most direct control over--and also serves as a meaningful variable in the search and discovery algorithm.

3b. Thumbnail unit

When YouTube serves videos to users it does so by rendering a group of components called a Thumbnail Unit (TU). TUs are comprised of various metadata and descriptors including the title and video thumbnail image. Depending on the viewer's platform (mobile, desktop computer, etc.) and section of the site video is being displayed the visual appearance of a TU will vary, however, the contained information remains the same.
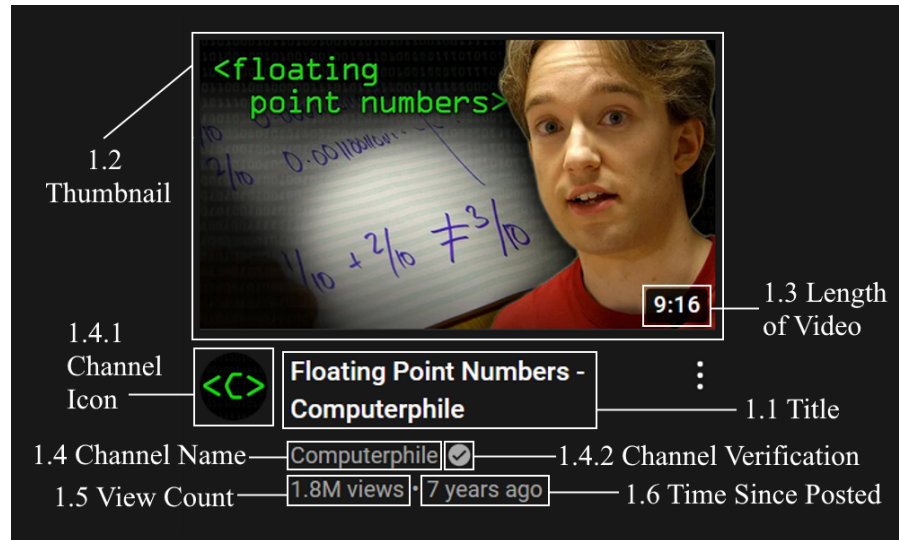

Figure 1: TU diagram

The components of a TU as shown in *Figure 1* are as follows: Title (1.1), Thumbnail (1.2), Length of Video (1.3), Channel Name (1.4), Channel Icon (1.4.1), Channel Verification (1.4.2), View Count (1.5), Time Since Posted (1.6), New Tag (1.6.1). Under certain viewing conditions, the Channel Icon will not be rendered in the TU. Additionally, the Channel Verification and New Tag components are contingent on external variables that vary between creators and will not be displayed in all scenarios.

Within the scope of uploading content for a single video, the creator solely has direct control over the Title, Thumbnail, and Length of the video. For other components, the creator has indirect control, namely for the Channel Name and Channel Icon. This class of elements is freely set by the creator but are determined independently from the context of a particular video--placing them outside of the scope of a video-wise analysis. Finally, the remaining components are environmental: Channel Verification, View Count, Time Since Posted, and New Tag.

Within the set of directly controllable TU elements, there are semantic restrictions. The Title element, as displayed in the TU, is constrained by an approximate maximum of sixty characters or twelve words before overflow cuts off the text. Thumbnail images maintain an aspect ratio of 16:9 and are fully rendered with the caveat that the Length of Video component occludes the bottom left corner (*Figure 1*). In desktop watch page video feeds, a major source of traffic, the size of a Thumbnail image is internally stored as a 336x188px file but only displayed as 168x94px. This size changes for desktop homepage video feeds, being stored as a 720x404px

image and being rendered adaptively per browser scale. Finally, the Length of Video component is displayed in an MM:SS time format in the position displayed in *Figure 1*.

3c. Informational Gestalt Principles

While the individual elements of the TU have some effect on whether a user will engage with a given YouTube video, the driving source of engagement is often the semantic interaction between elements. Most of the extant literature solely examines the informational or graphical value of discrete elements, most notably the title of the video. What is lacking in said research is an analysis of the interaction between elements like the Thumbnail and Title and, more broadly, the complete set of interactions between all elements exposed to potential viewers.

Gestalt Theory provides a framework that analyzes how elements of a design combine to form a unique identity different from the sum of individual parts. Gestalt theory's core application in visual design is as a framework to estimate human perception of elements and element interaction. Within the context of TU design, the application of Gestalt principles is a useful tool to guide creators in communicating clearer, more expressive presentations of videos. Gestalt has historically been used to analyze the graphical components of design, however, applying Gestalt principles to the informational content of a design provides a new and helpful lens of analysis. A subset of Gestalt principles and their informational counterpart in the context of TU design are listed below.

The proximity principle states that objects close to one another are perceived to be more related than those further apart. Informational proximity states that objects associated with similar concepts will subconsciously be evaluated as part of the same group. This definition is also analogous to the informational counterpart of the similarity principle. Both informational proximity and informational similarity will be used interchangeably.

The figure and ground principle occurs when an object's contour facilitates the formation of a subsequent item. In other words, one form acts as an existential background for another. Given this definition, informational figure and ground is concerned with the framing of one concept with other contrasting information. One concept may be meaningless without the context of another. The informational figure and ground principle can create one unified idea around the contrast of concepts.

The closure principle generally articulates how gaps in designs are often mentally filled in to create a unified whole. If the viewer expects the whole, they will perceive it despite the design being a set of disparate objects. The informational closure principle is exemplified in asking a question meant to be answered by the observer. The information gap is filled by an observer, creating implicit meaning that was never explicitly defined.

3d. Gestalt Analysis of interaction:

The general goal of a creator producing a video is to maximize the reach of the video given the limited set of input parameters they possess. A video's most outward-facing elements

are contained within the TU, in fact, CTR is deeply predicated on the limited information displayed within the TU. The goal of this Gestalt analysis is to show the application of visual and informational Gestalt principles to TU design, examine hypothesized interactions between TU components, and analyze how these interactions affect visual and informational saliency. This research cannot in good faith make definite correlations between TU components and CTR, further research with the application of the outlined framework is required. CTR is ultimately determined by the preferential decisions of a large set of individuals. Quantifying causal relationships to CTR is difficult but qualifying some relationships is more than feasible given the highly limited set of information displayed in a TU. It must be noted that outside of the TU there is a notable set of factors that influence CTR: subject matter, noise concerning individual perception, variables regarding the video such as video genre or topic, and many more contextual variables.

Figure 2: TU regions

Within a Gestalt analysis, each TU can be thought of as having three distinct sections: the thumbnail, the title, and metadata regions (*Figure 2*). Within regions, components are semantically grouped by their graphical proximity and informational similarity. Because of the uniformity of TU structure, the distinctions between regions are reinforced over time, viewers developing semantic expectations for the scope of content within each.

The thumbnail region has the most visual presence of all regions and is comprised of the Thumbnail and Length components. The Thumbnail dominates the region, but the Length component plays an important semantic role in the TU. Depending on the subject matter and genre of the video, viewers will expect a certain video length. If the length differs significantly from this expectation viewers may respond negatively. For example, if the premise of the video is to summarize a piece of literature, multi-hour lectures may drive viewers away when competing with five-minute explanations.

The Thumbnail component provides some of the richest and most visually stimulating elements of a TU design. Additionally, being one of the few elements entirely designed by the TU creator, the Thumbnail allows for the employment of Gestalt principles and visual tactics

more than any other component. In most cases on YouTube, TUs are presented in lists where individual TU designs compete for viewer interaction. The Thumbnail component, having a powerful visual presence, is one of the strongest differentiating factors in visual saliency.

Where the thumbnail region may have a higher visual presence, the title region generally delivers the most information to a viewer. Like the thumbnail region, the title region also allows for a high degree of designer control, however, limitations to the length of the Title component cap the amount of conveyable information.

The metadata region is comprised of components that creators have the least control over and generally play a more cursory role in TU saliency. There are three minor subsets components in the metadata region that serve distinct functions.

The Channel Name and Channel Icon are identifiers of the YouTube channel. Familiarity with channel identifiers may produce a contextual expectation given the channel's body of work which when combined with the context in a TU, may produce viewer value judgments. Additionally, a topical channel name creates informational similarity between the Thumbnail, Title, and Channel Name components which may reinforce a viewer value judgment of the TU.

The second subset of components in the metadata region is Time Since Posted and New Tag. This set primarily serves as an indicator of relevance.

The third set of components are the Views and Channel Verification. These components serve as indicators of value. Zhou *et al.* (2016) found that videos with a relatively high number of views gain views at a higher rate. Viewers that see a TU with a high number of views may see the content to be more credible or interesting and may choose to interact with the TU based on that value judgment. Similar extrapolations can be made for the Channel Verification component as it indicates that the creator's channel has more than 100,000 subscribers and has passed YouTube's verification process.

The most promising use of Gestalt analysis is in the creation of points of saliency to direct viewer impressions. On YouTube, TUs must compete for attention. By using certain Gestalt tactics in the creation of TUs can allow designers to better control visual flow, points of interest, and, as will be shown in section 5, prompt viewers to engage through the creation of curiosity gaps.

The use of informational figure and ground between the Title and Thumbnail components is common and effective. The designs of both components have high degrees of freedom and together both convey the most pertinent information to viewers. By coupling the two together with an informational figure and ground relationship--making the informational content of one dependent on the other--TU designers can create a more cohesive design that can cover a larger breadth of information.

Other visual and typographic tactics are common to increase saliency within Thumbnails and Titles. Often designers use arrows--which leverage the Gestalt principle of common-fate--to direct attention to certain objects, regions, or concepts. Textual emphasis by capitalization and

other exploits of typographic hierarchy uses the principle of similarity to create salient regions to emphasize concepts and words.

4. The Curiosity Gap and Effects on Design

Marketing strategies used in YouTube TU design--and most click-hungry marketing--can be classified by their degree of exploitation of the "curiosity gap." A curiosity gap occurs when individuals are faced with a gap of information between what they currently know and what they would like to know (Loewenstein, 1994). In the realm of virtual marketing, the term has come to describe promotional material that incites curiosity, this curiosity being seen as the primary force driving users to engage with said material (Scott, 2021). Applied to TU analysis the curiosity gap is most closely related to the informational Gestalt principles of closure and figure and ground as such principles are used to draw blatant information gaps. Designs that use information to drive users to answer questions or examine information in some implicitly provoking manner can prompt information gaps. Using Gestalt principles of design and principles of visual and typographic hierarchy to create visual saliency to direct attention (Keyes, 1993; Tepper *et al.*, 2014) can allow for more directed paths of perception that prompt information gaps. Proper informational gaps applied to interesting subject matter--whatever a viewer-base is subjectively drawn to--will result in the formation of curiosity gaps. The nature of interesting subject matter is highly variable on platforms such as YouTube and is dependent on genres, topics, subtopics, relevancy, saturation, and many more variables. Subject matter must be acknowledged as one of the strongest drivers for user interaction but, as discussed in section 3d (Gestalt Analysis of interaction), will be viewed as noise within the context of our current analysis.

4a. Curiosity Gap Exploitation:

Figure 3

Figure 3 is a perfect example of a TU exploiting a curiosity gap to drive viewer interaction. There are several information gaps the video creator is forming.

First, there is the Thumbnail information gap: The designer obscures information, the face of the chef, to create an artificial lack of knowledge for the viewer. On the left side of the image, there is a clear tactic using the man pointing, creating a point of visual saliency directing the observer to focus on the information gap.

Within the Title component, there is an immediate typographic emphasis "BEST" which makes this component more salient within the TU and focuses on the expectation of subject matter.

The informational figure and ground principle ties the Thumbnail and Title information gaps together. Without context, the Thumbnail component does not communicate a clear message, it is only given the background provided by the Title's subject matter that the informational content of the Thumbnail can be observed. On a small scale, the ambiguous nature of the Thumbnail's information gap creates an added information gap that directs observers to contextualize the information by reading the Title. This example shows how employing informational figure and ground can lead to the creation of meta-information gaps.

The semantic connection between the two elements is aided by informational similarity: the Thumbnail clearly depicts culinary elements, the environmental context is that the TU is displayed on YouTube, and the Title focuses on cooking YouTube videos. This relationship prompts a level of cohesion within the TU design.

The designer of this TU has coordinated several cohesive information gaps, including meta-information gaps to direct the viewer's attention. Marketing itself as a review of the "BEST cooking videos," the constructed information gaps conceivably prompt curiosity gaps for those who are interested in the subject matter. Creating a curiosity gap in this manner has enabled the video producer to make the conceptual premise of his content more eye-catching and appealing to a broader audience.

4b. Hyper-Exploitation:

While the exploitation of the curiosity gap can be utilized to draw audiences and make complex topics more palatable, hyper-exploitation of the curiosity gap may lead to negative results. The modern phenomenon of clickbait encapsulates how the hyper-exploitation of the curiosity gap may drive contemporary audiences away from content using strategies that might have worked on previous generations of internet users. Hyper-exploitation of the curiosity gap has been found to have diminishing, if not negative, returns on engagement past a certain threshold.
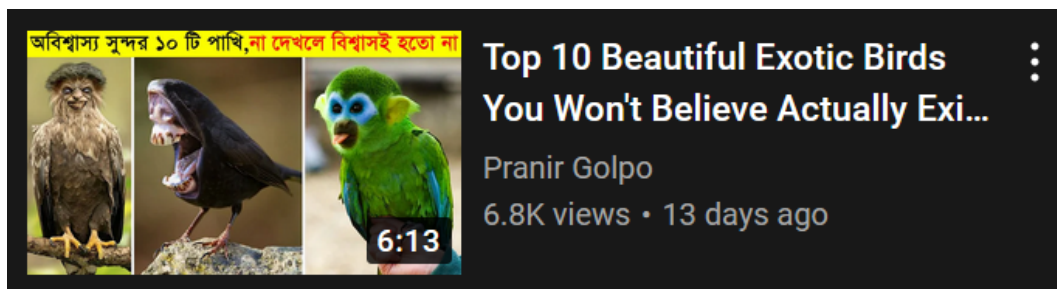

Figure 4

This example demonstrates the limitations of using the curiosity gap to an advantage. The verbiage used in the Title component is hyperbolic and employs the common pattern "Top ___ You Won't Believe." While this tactic may have worked in a different era of the internet, the exaggerated information gap is seen as an obvious deceptive ploy for attention by most modern YouTube viewers.

The Thumbnail component contains has several photoshopped bird-animal crossovers that objectively prompt a massive incongruence between viewer expectation and what is presented. From a naive point of view, these figures would create a massive information gap that would drive a high CTR, however, in a modern perspective, most viewers would discard the presented information gap as irrelevant because of how blatantly misrepresentative it is. Leveraging the information gap to this extent leaves the subject matter open to scrutiny and skepticism which immediately dissipates any meaningful creation of a curiosity gap.

In this case, the visual ambiguity of the Thumbnail component invokes an informational figure and ground phenomenon between itself and the Title, similar to the first example. However, because of the leveraging of hyperbolic information gaps, this figure and ground relationship reinforces viewer skepticism and diminishes the chances of the formation of a curiosity gap from a viewer.

The major flaw in hyper-exploitation of the curiosity gap is that modern viewers respond negatively to deceptive tactics. Leveraging information gaps too far may expose the TU to excess scrutiny and obvious hyperbolic attempts to attract attention will quickly undermine that leveraged position.

4c. Anti-Exploitation:

Another strategy used in YouTube TU design is the anti-exploitation of curiosity the gap. In contrast to traditional invocations of the curiosity gap, anti-exploitive designs seemingly resolve information gaps rather than expand them. Such designs involve informational figure and ground between several elements, namely the Title and Thumbnail components, resolving a self-imposed information gap created by a subset of components involved in the figure and ground relationship. Common examples involve answering a probing question or stating a seemingly obvious conclusion. While such designs may resolve an overt information gap, they often open a deeper covert curiosity gap, generally occurring as the semantics of the resolution deliver an unexpected result; this covert curiosity gap being the driving factor in user interaction.

Figure 5

Figure 6

Above are two examples of anti-exploitation of the curiosity gap from the YouTube channel Veritasium, a proprietor of the strategy. In each of the examples, an information gap is created by posing a question in the Title component which is immediately resolved with an answer located in the Thumbnail. Where the conclusion of *Figure 5* seems to be relatively expected, the conclusion of *Figure 6* goes against the expectations of many viewers. While both videos rely on the same framework of anti-exploitation, this difference shows two distinct methods a curiosity gap manifests.

The first example, arriving at a relatively uncontroversial conclusion, cannot rely on a reversal of expectations to drive curiosity. Rather, we hypothesize that the major implicit information gap comes from the definiteness of the conclusion and the lack of information viewers have regarding the mechanics of salt lamps. There is some implicit omission of information regarding what it means for a salt lamp to "work" as the title puts it. This information gap widened with the terse and definitive nature of the response in the Thumbnail. The video additionally leverages the information gap from a viewer's lack of knowledge of the subject matter. The curiosity gap derived from the gap in knowledge of subject matter is more dependent on the perceived value of the subject matter itself, however, it is still an appreciable force to be considered.

The second example is similar in structure to the first, using the same mechanisms of having a blunt, definitive answer to an ambiguous question. In this case, the curiosity gap invoked by the TU is not derived from the ambiguity of the question, as it is already resolved. The curiosity gap comes from the complex implications of the resolution to that question. This case directly confronts viewer expectations in the conclusion reached. We hypothesize the audience of the video has an expectation of the inherent validity of scientific research to some

extent. By directly confronting this expectation the TU designer captivates viewers. Subversion of expectation creates an extraordinarily strong curiosity gap as viewers are interested in why their perspective is being confronted, the gap being reinforced by how definitively the confrontation is presented.

4d. Non-Exploitative Designs:

Finally, there is the set of TU designs that do not exploit the curiosity gap. This is not to say that the design does not prompt a curiosity gap, but the TU's information gaps are generally formed by omission or by viewers' lack of knowledge. Designs within this set focus on clarity of phrasing, conciseness, and being self-explanatory. This strategy is in many ways the "default" as it is often assumed when no there is no explicit design chosen for a TU. Subsequently, the majority of TUs on YouTube may be grouped within this set. The efficacy of such designs is highly predicated on the quality of the subject matter and will produce variable, polarizing results.

Figure 7

This example shows a TU with little exploitation of information gaps. The Title component concisely summarizes the concept of the video, the Thumbnail showing a labeled picture tersely reinforcing the subject matter. The underlying information gap invoked by the TU is not from an omission or any lack of clarity, rather, it is derived from the novelty of superconductors as exemplified in the Thumbnail image. While the designer employs a captivating image and spends time aesthetically simplifying elements, directing viewers' focus to key concepts and figures, they have not pushed boundaries to create an artificial information gap. In this case, the quality of the subject matter is strong enough to create a massive curiosity gap for a large audience solely by its display.

Figure 8

In the case of this second example of non-exploitation, while being as self-explanatory as the first, does not captivate viewers as strongly. Some aesthetic differences may explain the discrepancy in TU value between the examples but the major reason the first creates a stronger curiosity gap is due to its relative strength in its subject matter.

Without the leverage of curiosity gap exploitation, CTR is prone to be more contingent on an audience's perception of subject matter value. With the second example, the video may benefit from an augmented design to entice a larger pool of viewers with new Title and Thumbnail components. The first example is arguably better off without the addition of explicit curiosity gap exploitation. Viewers value concise, straightforward, and truthful depictions of video content and react negatively to the opposite (as evidenced by the hyper-exploitation phenomenon). With the potency of the subject matter displayed in the first example, attempts to add information gaps might put the TU into a hyper-exploited state for some viewers, diluting the effect of the curiosity gap on CTR.

5. Conclusion

The process of gaining views on YouTube is contingent on a myriad of disparate factors. The variable that YouTube video producers have the most control over is video is CTR, a metric primarily contingent on viewer perception of the TU. To drive a higher CTR, TU designs can employ strategic elements is to exploit curiosity gaps experienced by viewers, as found by Scott (2021). The creation of information gaps is a multi-stepped process that requires the interaction of several visual and informational components within the design. Using an augmented set of Gestalt principles, designers can capture viewer attention with points of perceptual saliency and drive them across engineered information gaps. We hypothesize that the employment of this proposed design framework may have a positive effect on CTR and video views. Further research is required to empirically validate the hypotheses of this proposed design framework. This validation may prove difficult as metrics are hard to access, for example, CTR records are generally private for YouTube videos, some metrics are hard to quantify, and most quantifiable results have a high amount of statistical noise due to the complexity of the problem.

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