

Popular Science Books as a Site of Translational Activism: Stephen Hawking's "A Brief History of Time: From the Big Bang to Black Holes" as a Case in Point¹

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Abstract

The main goal of the present paper was to explore the influence of the sociopolitical context of post-revolutionary Iran on the production of the English into Persian translations of popular science books. It particularly aimed to reveal the resisted themes, and to detect and classify the translators' applied forms of engagement in the translations. *A Brief History of Time: From the Big Bang to Black Holes* was selected for doing the study. The whole text, footnotes, and the appended paper were examined. The research was carried within Tymoczko's theoretical framework (2010a; 2010c; 2010d) that conceptualizes political and ideological agency and activism in translation by using two metaphors of resistance and engagement, and classifies different forms of engagement in translation. The results showed that the translator had tried to provide an almost exact translation of the original scientific text. Nevertheless, he had encoded activism in both forms of resistance and engagement through selection of the text for translation, and commentary on translation in the form of footnotes and a paper appended to the end of the book. He had tried to maintain timeless religious, and cultural beliefs by using ideological agendas as the basis for presenting Western scientific ideas and comments to the Iranian target audience.

Keywords: Activism, resistance, engagement, popular science books, *A Brief History of Time: From the Big Bang to Black Holes*, Stephen Hawking

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1. Introduction

In recent years, a considerable literature has grown up around the topic of translation activism, and key terms like *intervention* and *resistance* have gained significance in Translation Studies research arena (Wolf, 2013). The researchers' prevailing view is that translation is "a mode of counterespionage, resistance, and rebellion" (Tymoczko, 2010d, p. 16). Adopting a similar approach, this study also surveys activism (resistance and engagement), in the translations of popular science books done in Iran after the Islamic Revolution of 1979. Since its establishment after the cultural and ideological Islamic Revolution, the state has principally defined its role in a religious and cultural framework (Nakanishi & Mousavi, 2017, p. 2), and has maintained a unique resistant, official "anti-Western/anti-American ideological stance" (Golmohammadi, 2019, p. 94) affecting translation practices.

A Brief History of Time: From the Big Bang to Black Holes was selected as the corpus of the study. It is a *Stephen Hawking* book, the world-famous English theoretical physicist, cosmologist, and author whose books are famous for both English and Persian readers. It has been translated from English into Persian by Mohammad Reza Mahjoub in 1384 [2005]. In this genre-defining book (the first science book written for non-specialists, i.e. laymen), Hawking addresses fascinating subjects like the nature of space and time, the role of God in creation, and the history and future of the universe with an engaging voice and tries to make them accessible to the non-specialist readers. As such, the mere selection of the book for translation has been an activist decision, in line with the publisher's (Sahami-e-Enteshar Publishing Company) belief in polyphony and aim of enhancing awareness among Iranians of recent, impressive scientific ideas (Razavi, 13 March, 2021). Besides, it could also be expected that Hawking's famous controversial ideas on these subjects have made it a site of translation activism (resistance and engagement) in post-revolutionary Iran. So, the study aimed to answer the following questions regarding the aforementioned book based on the conceptual framework

developed by Tymoczko (2010a; 2010c; 2010d): (1) what is resisted in the Persian translation of *A Brief History of Time: From the Big Bang to Black Holes?* and (2) what forms of engagement can be discerned in it?

2. Review of Literature

2.1. Theoretical Framework

The study was carried out within the conceptual framework developed by Tymoczko (2010a; 2010c; 2010d), who conceptualizes political and ideological agency and activism in translation by using two metaphors of resistance and engagement. While resistance is reactive (it refers to an act of opposition to a force or power) and restrictive, and limits “the translator to a more passive role than is required or desirable,” engagement is proactive, entails commitment and suggests actions that might “involve solidarity with other people” and goes beyond “reactions or oppositions to an external powerful force” (Tymoczko, 2010d, p. 11). Her proposed forms of engagement in translation are rousing, inspiring, mobilizing, witnessing, or inciting to rebellion and so forth (Tymoczko, 2010a, p. 213).

2.2. Review of the Related Literature

Regarding the issue of resistance in Translation Studies, there exist at least three major collections of essays: *Translation, Resistance, Activism* (2010c), edited by Maria Tymoczko, and *Translation and Opposition* (2011), edited by Asimakoulas Dimitris and Margaret Rogers, and *The Routledge Handbook of Translation and Activism* (2020), edited by Rebecca Ruth Gould and Kayvan Tahmasebian. All these three collections view translation as a potential site of empowerment, and try to show how the agency of translators can take an activist form such as resisting/opposing or supporting political or moral positions. Aiming at illuminating specific historical examples, they discuss the pragmatic and theoretical issues such as translators’ choices, the partial nature of resistant

translations, and the roles of resistant translations in the target culture. Similarly, few Iranian researchers have dealt with the Iranian context (e.g. Farahzad, 2013; Ghaderi, 2018). However, the notion of cultural resistance to the ideological imports in the Iranian context seems to be still under-researched.

3. Methodology

This research was a descriptive, exploratory corpus-based study. The data came from the whole Persian text of *"A Brief History of Time: From the Big Bang to Black Holes,"* and its English source text as well as all the translator's footnotes, and the paper added to the Persian translation (paratextual elements). The study examined translations in the light of Tymoczko's (2010a; 2010c; 2010d) definition of translation as both forms of resistance and engagement. It aimed to reveal what was resisted in the translation, and detect and classify the engagement forms used by the Iranian translator.

First, the whole English book was read, examined, and compared with the Persian translation to detect the textual alterations that could be attributed to the ideological resistance and engagement, and if so, provide a descriptive discussion of such alterations with respect to the main themes they presented, and classify different forms of engagement.

Then, the translator's footnotes were examined. Mahjoub, the translator, had revealed his resistant, critical position by accompanying three extracts of the text with a similar activist footnote: "Since the publication of the book in Europe and the United States, such issues have been criticized and answered, a sample of which has been translated and published at the end of the book." (1384 [2005], pp. 172, 179, & 216). So, the researchers examined the topics presented in these extracts of the text with reference to the paper *"The Big Bang, Stephen Hawking, and God,"* the transcription of a public lecture (paper) given by Schaefer (1994) added to the end of the Persian text by the translator, to reveal how resistance was manifested in

the translation. Then, the whole content of the paper was examined and descriptively discussed, with respect to the main themes it presented, and classified based on different forms of engagement.

4. Data Analysis, Results, and Discussion

As it was previously mentioned, the study was done in the light of Tymoczko's (2010a; 2010c; 2010d) definition of translation as both forms of resistance and engagement.

Resistance

The activist footnotes guided the readers to the paper "*The Big Bang, Stephen Hawking, and God*". According to the translator's footnotes (Mahjoub, 1384 [2005], p. 233), the paper is a rewriting of the major parts of Fritz Schaefer's lecture given at the University of Colorado in the spring of 1994 at the invitation of a Christian leader and other university officials. More than 500 students and professors had attended the lecture. Schaefer is the Graham Perdue Professor of Chemistry and Director of the Center for Computational Chemistry at the University of Georgia. He has defined his goal as finding a part of God's plans, and found the joy of scientific research in discovering new things, wondering how God did his creation (Schaefer, 1994, p. 233).

Appended to the end of the book, the paper apparently functioned as an afterthought or comment for the readers who had already formed their own schema. In the following section, those text extracts related to the footnotes will be presented along with their Persian translations. Then, the most related parts of the paper which show resistance to the ideas presented in the text extracts will be discussed. This helps to highlight the resisted themes and the way resistance has been manifested (It is noteworthy that presenting the whole scientific discussion is beyond the limits and scope of this study):

1. **ST.** If Euclidean space-time stretches back to infinite imaginary time, or else starts at a singularity in imaginary time, we have the same problem as in the classical theory of specifying the initial state of the universe: God may know how the universe began, but we cannot give any particular reason for thinking it began one way rather than another. On the other hand, the quantum theory of gravity has opened up a new possibility, in which there would be no boundary to space-time and so there would be no need to specify the behavior at the boundary. There would be no singularities at which the laws of science broke down, and no edge of space-time at which one would have to appeal to God or some new law to set the boundary conditions for space-time. One could say: "The boundary condition of the universe is that it has no boundary." The universe would be completely self-contained and not affected by anything outside itself. It would neither be created nor destroyed. It would just BE (Hawking, 1988, p. 136).

ترجمه: اگر قلمرو فضا-زمان اقلیدسی به اعماق گذشته‌ها و زمان موهومی نامتناهی گسترش یابد، یا آنکه در لحظه‌ای از زمان موهومی با یک تکینگی آغاز گردد، همان مشکل نظریه کلاسیک یعنی مشخص کردن حالت آغازین گیتی، پیشاروی ما قرار می‌گیرد: خداوند از چگونگی شروع جهان آگاه است، اما ما نمی‌توانیم هیچ دلیل خاصی ارائه دهیم که چرا گیتی به این گونه و نه به گونه‌ای دیگر آغاز شد. از سوی دیگر، نظریه کوانتومی گرانش، امکان دیگری را گشوده است که بر اساس آن فضا-زمان فاقد کرانه است و بنابراین نیازی به مشخص نمودن رفتار گیتی نیست. نه **تکینگی** ای در کار است که قوانین علم را خنثی سازد و نه لبه‌ای برای فضا-زمان در نظر گرفته می‌شود که ناگزیر به قانون نوینی جهت تعیین شرایط مری فضا-مان متوسل شویم. به تعبیری: «شرط مرزی جهان عبارت است از آنکه مرزی ندارد.» جهان یکسره در خود می‌گنجد و متأثر از چیزی خارج از خود نیست. نه آفریده شده و نه از بین می‌رود و صرفاً وجود دارد (هاوکنگ، 1988 / 1384 [2005]، ص. 174).

Explanation: The lecturer (Schaefer, 1994, pp. 247–248) levels criticism at Hawking's no-boundary proposal, i.e. the universe as a wave function, popping into existence 15-20 billion years ago: He first admits that the notion of imaginary time is a powerful mathematical trick (tool) that is used on occasion by theoretical chemists and physicists. But, then, he puts that in *Hawking and Hartle's No-Boundary Proposal*, the notion that the universe has neither beginning nor end is something that exists in mathematical terms only. Doing so, he refers to Hawking's (1988) two contradictory statements: "When one goes back to the real time in which we live, however, there will still appear to be singularities (p. 138)," and "in real time, the universe has a beginning and an end at singularities that form a boundary to space-time and at which the laws of science breaks down" (p. 139). He adds that science is primarily concerned with facts, not motive, and thus a

complete scientific description of the creation does not rule out a providential account at the same time.

2. ST. The idea that space and time may form a closed surface without boundary also has profound implications for the role of God in the affairs of the universe. With the success of scientific theories in describing events, most people have come to believe that God allows the universe to evolve according to a set of laws and does not intervene in the universe to break these laws. However, the laws do not tell us what the universe should have looked like when it started—it would still be up to God to wind up the clockwork and choose how to start it off. So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: it would simply be. What place, then, for a creator? (Hawking, 1988, p. 141)

این اندیشه که فضا و زمان سطح بسته بی‌کرانه‌ای را تشکیل می‌دهد، دلالت‌های ضمنی ژرفی پیرامون نقش خداوند در امور عالم در بر دارد. موفقیت نظریه‌های علمی در توضیح رویدادها موجب شد که بیشتر مردم باور کنند که خداوند گردش جهان را مطابق مجموعه‌ای از قوانین اراده کرده است، و برای شکستن و نقض این قوانین دخالتی در امور آن نمی‌کند. اما قوانین درباره آغاز جهان چیزی به ما نمی‌گویند—هنوز این خداوندگار است که ساعت جهان را کوک می‌کند و چگونگی آغاز آن را برمی‌گزیند. مادامی که جهان آغازی داشته باشد، می‌توان برای آن آفریدگاری فرض کرد. اما اگر جهان واقعاً یکسره خودگنجا و بدون کرانه و لبه‌ای باشد، آنگاه نه آغازی خواهد داشت و نه پایانی؛ جهان صرفاً هست. آنگاه جایگاه آفریدگار چه خواهد بود؟ (هاوکینگ، 1384/1988 [2005]، ص. 179).

Explanation: As previously mentioned, the lecturer levels criticism at Hawking's no-boundary proposal and hence this argument. He also reminds the reader that Hawking is not an atheist, but an agnostic or deist or something more along those lines, but he is uncertain about his belief in a god of his own creation (Shaffer, 1994, p. 245).

3. ST: However, if we do discover a complete theory, it should in time be understandable in broad principle by everyone, not just a few scientists. Then we shall all, philosophers, scientists, and just ordinary people, be able to take part in the discussion of the question of why it is that we and the universe exist. If we find the answer to that, it would be the ultimate triumph of human reason—for then we would know the mind of God (Hawking, 1988, p. 175).

ترجمه: اما اگر نظریه‌ای کامل کشف کنیم، به‌موقع خود، همگان و نه معدودی از دانشمندان خطوط اصلی آن را درک خواهند کرد. آنگاه همگی ما، فلاسفه، دانشمندان و حتی مردمان عادی، قادر خواهیم بود در بحثی پیرامون این سؤال

شرکت جوییم که چرا ما و جهان وجود داریم. اگر پاسخی به این سؤال بیابیم، همانا پیروزی فرجامین خرد انسان خواهد بود- چرا که آنگاه بر ذهن خداوند آگاهی یافته‌ایم (هاوکینگ، 1384 / 1988 [2005]، ص. 216).

Explanation: The lecturer (Schaefer, 1994, p. 245) is sympathetic to this statement but thinks that Hawking is claiming a bit much. He would modify it to say that "if we had a unified, complete theory, we would know a lot more about the mind of God." On the whole, the lecturer believes that science has limits; it knows nothing of God and eternity. But, Hawking is in search of a complete understanding of the events, and of our own existence (Schaefer, 1994, p. 250).

To conclude, the lecturer treats the book with respect, and believes that Hawking's success as a popularizer of science, is due to his way of addressing the problems of meaning and purpose, that concern all thinking people. He believes that the book overlaps with Christian belief and it does so deliberately, but graciously, and without rancor (Schaefer, 1994, p. 243). However, he does not totally agree with its whole content. Some of the scientific ideas and themes presented in the book especially those questioning the existence of God and His role in creation of the universe, and His infinite unique attributes have faced his strong criticism and resistance.

Engagement

A combination of different forms of engagement have been used in the paper that value the significance of Hawking's book and scientific achievements but present different narrations or (philosophical) interpretations of the scientific achievements, or deal with different standpoint of the lecturer from Hawking's (and hence the translator's as he has selected and included the paper at the end of the book), and refer to limits of science or address cases of sensitive religious and ideological matters. They will be discussed in detail as follows:

Rousing

Using this form of engagement, the lecturer, either consciously or subconsciously challenges the authors' position. The issue has been too important to him that he aims to stress his position, even ridiculing the author's opposing points of view which he believes have not well supported by facts. He wants others to follow his dictates, rouse the same negative attitudes and feelings such as anger, hatred, etc. This form has been rarely used, however, only in dealing with sensitive ideological matters such as the existence of God or the value of human beings in the universe.

Example:

لازم است یک سخن مناقشه برانگیز دیگر هاوکینگ را مورد بررسی قرار دهیم. اصل این سخن از هاوکینگ نیست ولی گفته هاوکینگ به قرار زیر است «ما مخلوقات بی اهمیتی بر روی سیاره‌های کوچک از یک خورشید متوسط در حومه‌های بیرونی یکی از یکصد میلیارد کهکشان هستیم. از این رو به سختی می‌توان به خداوندی باور داشت که چندان در فکر ما یا حتی متوجه وجود ما باشد.»
 پاسخ من به این سخن هاوکینگ و دیگرانی که آن را طی سالها به زبان رانده‌اند اینست که این گفته‌ای ابلهانه است (شفر، 1994، ص. 248).

Hawking's ideas about God and human beings have been ridiculed and considered as silly, aiming apparently to rouse the same feelings in the audience.

Inspiring

In some cases, where the information or statements deemed harmful or in contrast with the vast public's beliefs and ideologies, the lecturer seemingly aims to take the opportunity to constructively address them by bringing counter examples of the prominent and influential figures or evidence that reject them. Perhaps, he thinks it is the easiest way to inspire the readers with faith, and make people accompany him in his religious faith and avoid atheism.

Example:

بسیار نادرند فیزیکدانانی که به راستی منکر خداوند باشند. چرا چنین است؟ فریمن دایسون (Freeman Dyson) یک عضو دانشگاه پرینستون می‌گوید «طبیعت بیش از آنچه انتظارش را داشته باشیم نسبت به ما مهربان است.» [...]

برخی دانشمندان از این همه رویدادهای تصادفی شگفت‌زده می‌شوند. اما هنگامی که به جای دلبخواهی بودن قوانین طبیعت، هدف قدسی را جایگزین سازیم، این شگفتی به زودی رنگ می‌بازد (شفر، 1994، ص. 247).

He claims that physical scientists are rarely atheist. He maintains that some of them express surprise at so many accidental occurrences. However, that astonishment quickly disappears when they see divine purpose instead of arbitrariness in the laws of nature. As such, he aims to inspire hope and faith in the audience.

Mobilizing

In one occasion, the lecturer emphasizes complete harmony with the author, calling the buyers of the book to take action and actually read the book which, in his view, is worth reading. He seems reasonable enough to acknowledge the value of the book, and his author and his significant scientific achievements. He tries to mobilize them to read the book and get familiar with the latest scientific achievements, and different ways of interpreting them and prepares the ground for judging its content. He seems to aim at enhancing public awareness.

Example:

لازم نیست با هر آنچه در کتاب تاریخچه زمان آمده است موافق بود و خواهید دید که من با بخشهایی از آن مخالفم. گفته شده است که این کتاب ناخوانده‌ترین نوشتار تاریخ ادبیات است. من نخست این مطالب را برای یک سخنرانی در دسامبر ۱۹۹۲ آماده کرده بودم زیرا دوستی در استرالیا آن را از من خواسته بود. او می‌گفت: «عده زیادی از مردم سیدنی این کتاب را خریده‌اند و برخی ادعا می‌کنند آن را خوانده‌اند.» بنابراین من به شما سفارش می‌کنم که از کسانی باشید که واقعاً «تاریخچه زمان» را بخوانید. (شفر، 1994، ص. 243)

As discussed above, the lecturer encourages the audience to take action and read the book, not only to buy it! However, he argues that there is no reason to agree with everything put forth in it, as he, himself, has some areas of disagreement.

Witnessing

It seems that the lecturer has aimed to base his speech on mutual respect; he frequently provides evidence for his sayings and criticism in forms of the well-distinguished scholars' anecdotes and quotations or scientific facts or events. Thus,

witnessing is usually used for the cases where he agrees with a part of the original authors' idea about or interpretation of the event but tries to give new information or interpretation about that same event.

Example:

دانشمندان با ایمان

آیا در موارد فوق همه با استیون هاوکینگ هم عقیده‌اند؟ پاسخ منفی است. یک استاد MIT به نام آلن لایتمن (Alan Lightman) در کتاب «سرچشمه‌ها؛ زندگی و آثار کیهانشناسان مدرن» (انتشارات دانشگاه هاروارد، ۱۹۹۰) می‌گوید «بر خلاف باور رایج، دانشمندان در خصوص موضوعات مذهبی همان دیدگاه‌های عمومی و رایج را دارا هستند.» (شفر، ۱۹۹۴، ص. ۲۴۹).

انجمن علمی Sigma Xi چند سال پیش با انجام یک نظر سنجی نشان داد ۴۶ درصد دانشمندان دارای Ph.D. روز یکشنبه به کلیسا می‌روند، در حالی که این رقم برای عموم مردم ۴۷ درصد است. از این رو به نظر می‌رسد آنچه ایمان مردمان را پیرامون خداوند تحت تأثیر قرار می‌دهد ربط چندانی به اخذ درجه دکترا در علوم ندارد (شفر، ۱۹۹۴، ص. ۲۴۹).

نمونه‌های زیادی از دانشمندان برجسته که بر خلاف هاوکینگ می‌اندیشند وجود دارد. یکی از آنان چارلی تاونس (Charlie Townes) است که ۱۸ سال با او در برکلی همکاری بودم. او به خاطر کشف میزر (Maser) جایزه نوبل را ربود. او می‌گوید «به نظر من پرسش سرچشمه هستی از دیدگاه صرفاً علمی بی‌پاسخ مانده است. از این رو یک توضیح مذهبی یا متافیزیکی لازم است. من به مفهوم خدا و وجود او ایمان دارم.» (شفر، ۱۹۹۴، ص. ۲۴۹).

The lecturer claims that there are many prominent counter-examples to Stephen Hawking that believe in God and a need for some religious or metaphysical explanation, and tries to prove it by anecdotes and statistical data that prove and witness his (i.e. the lecturer's) claim.

Publicizing

In his speech, the lecturer widely refers to influential figures, books, scientific organizations and achievements. Hence, *publicizing* was added to Tymoczko's introduced forms of engagement to refer to this feature. Perhaps this feature could be well explained by the fact that the lecturer, who is a well distinguished scholar, has no personal conflict with the author. He is only in search of new knowledge, himself, and desires to help the public improve its understanding of the world and its obtained knowledge. He tries to obey the rules of scientific speaking and writing.

Example:

هاوکینگ احتمالاً معروفترین دانشمند زنده است. کتاب او به نام «تاریخچه زمان» با جلد شمیز نیز به چاپ رسیده است و من قویاً خواندنش را توصیه می‌کنم. این کتاب تا سال ۱۹۹۳ بیش از ده میلیون نسخه به فروش رفته است، و فکر می‌کنم ۵ میلیون نسخه با جلد زرکوب هم به فروش رسیده است. در تاریخ کتابهای علمی چنین فروش گسترده‌ای تقریباً بی‌سابقه است. (شفر، ۱۹۹۴، ص. ۲۳۹)

He introduces Hawking as a prominent figure, probably the most famous living scientist, and publicizes his book, *A Brief History of Time: From the Big Bang to Black Holes*, which has sold more than any book in the history of science writing and recommends its reading.

Finally, no engagement in the form of *inciting to rebellion* was observed, which seems quite logical. None of the translator has had such a goal in mind.

4. Conclusion

By linking textual and paratextual study of the translated text and the relevant political context of post-revolutionary Iran, the study aimed to explore the influence of the sociopolitical context of post-revolutionary Iran on the production of Persian translation of popular science books, and reveal what is resisted in the translations and detect and classify the forms of engagement in translation used by Iranian translators. *A Brief History of Time: From the Big Bang to Black Holes* was selected as the corpus of the study.

The results showed that the content of the book has been remained more or less unaltered in the translation, specifically the scientific ideas. That is, the book's controversial ideas about sensitive ideological and religious matters, such as God and his role in the creation of the universe, which seem not to fit the post-revolutionary Iran's religious and ideological framework, have been almost exactly presented in the translation.

Nevertheless, the translator has clarified his ideological stance regarding the contents of the book. Through the selection of the text for translation, and commentary on translation in the form of footnotes, and the appended paper at the

end of the book, the translator has encoded activism in both forms of resistance and engagement.

The credible paper that the translator has added to the Persian translation to encode his activism, belongs to Fritz Schaefer, a prominent, religious scholar. It acts as an afterthought or comment for the readers. This has undoubtedly been a clever decision as it has made the book publishable in Iran, and has let the Iranian readers be aware of the recent scientific achievements and thoughts.

On the whole, the translator has tried to maintain the concepts of timeless religious beliefs and culture by using ideological agendas as the basis for presenting Western scientific ideas and comments to the Iranian target audience.

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کتب علمی عامه‌پسند به مثابه مکانی برای کنشگری ترجمه‌ای: بررسی «تاریخچه

زمان: از انفجار بزرگ تا سیاهچاله‌ها» اثر استیون هاو کینگ^۱

مرضیه مداحی^۲ و حسین ملانظر^۳

چکیده

هدف اصلی مقاله حاضر بررسی تأثیر بافت سیاسی-اجتماعی ایران پس از انقلاب در تولید ترجمه انگلیسی به فارسی کتاب‌های علمی عامه‌پسند، مشخص کردن موضوعاتی که در ترجمه‌ها با مقاومت روبه‌رو می‌شود و نیز شناسایی و طبقه‌بندی اشکال درگیری به‌کاررفته در ترجمه مترجمان بود. تاریخچه زمان برای انجام پژوهش انتخاب شد. کل متن، پانوشتها و مقاله پیوست بررسی شد. این تحقیق در قالب چارچوب نظری تیموکزکو (۲۰۱۰ الف، ۲۰۱۰ ج، ۲۰۱۰ د) انجام شد که با استفاده از دو استعاره مقاومت و درگیری، عاملیت سیاسی و ایدئولوژیکی و کنشگری را در ترجمه مفهوم‌پردازی و اشکال مختلف ترجمه‌های درگیر را طبقه‌بندی می‌کند. نتایج نشان داد که سعی مترجم بر این بوده است که ترجمه نسبتاً دقیقی از متن علمی ارائه دهد. با وجود این، او کنشگری خود را، در هر دو شکل مقاومت و درگیری، از طریق انتخاب متن برای ترجمه، اظهارنظر در مورد ترجمه به‌صورت پانوشت، و مقاله‌ای که به انتهای کتاب ضمیمه کرده بود، رمزگذاری کرده بود؛ و سعی کرده بود برنامه‌های ایدئولوژیک را مبنای ارائه ایده‌ها و نظرات علمی غربی به مخاطبان ایرانی قرار دهد، و از این طریق عقاید و فرهنگ دینی را حفظ کند.

واژه‌های راهنما: کنشگری، مقاومت، درگیری، کتاب‌های علمی عامه‌پسند، تاریخچه زمان: *از انفجار بزرگ تا سیاهچاله‌ها*، استیون هاو کینگ

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