# Article information:

A novel type of compliant and underactuated robotic hand for dexterous grasping - Raphael Deimel, Oliver Brock, 2016
<https://journals.sagepub.com/doi/full/10.1177/0278364915592961>

# Article summary:

1. The article presents RBO Hand 2, a compliant and underactuated robotic hand that is capable of dexterous grasping.

2. The hand is made of soft, compliant materials and is inexpensive to manufacture, making it versatile and adaptable for specific applications.

3. The hand's passive compliance facilitates force closure in power grasps and allows for the use of environmental contact to aid in achieving a grasp, resulting in improved grasp performance.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article titled "A novel type of compliant and underactuated robotic hand for dexterous grasping" by Raphael Deimel and Oliver Brock presents the RBO Hand 2, a highly compliant and underactuated robotic hand that aims to achieve diverse and robust grasping with low control complexity. The authors argue that soft hands, which possess many mechanical degrees of freedom and can implement complex deformations, offer the best combination of versatility and simplicity in control.

The article starts by introducing the concept of dexterous grasping and its importance for task-dependent manipulation. It highlights the traditional approach of using complex, multi-jointed structures and sophisticated actuation mechanisms in robotic hands, which are expensive, difficult to design, and require complex sensing and control. The authors propose that passively compliant hands can be a viable alternative as they perform certain grasps robustly, have simpler mechanics, and require simpler control due to underactuation.

While the article presents an interesting concept and provides some evidence to support its claims, there are several potential biases and limitations that need to be considered.

Firstly, the article focuses primarily on the advantages of compliant hands without adequately addressing their limitations or potential drawbacks. While it briefly mentions that compliance may render dexterous grasping difficult or impossible according to common assumptions, it does not thoroughly explore this issue or provide evidence to counter these assumptions. This lack of balanced reporting raises questions about the validity of the claims made.

Secondly, the article emphasizes the benefits of passive compliance in achieving force closure in power grasps and facilitating interactions with the environment to aid grasp attainment. However, it does not provide sufficient evidence or experimental data to support these claims. The authors mention previous studies that show increased grasp performance in humans and robots through environmental contact exploitation but do not present their own experimental results in this regard.

Additionally, while the article mentions that RBO Hand 2 is capable of enacting 31 out of 33 grasp postures from the Feix taxonomy and evaluates its thumb dexterity using the Kapandji test, it does not provide detailed results or analysis of these evaluations. This lack of specific data makes it difficult to assess the true capabilities and limitations of the RBO Hand 2.

Furthermore, the article acknowledges that passively compliant hands have been built before but fails to adequately discuss or compare the RBO Hand 2 with existing designs. It briefly mentions some previous works in passing but does not provide a comprehensive analysis or evaluation of how the RBO Hand 2 differs or improves upon these designs. This omission limits the reader's understanding of the novelty and significance of the RBO Hand 2.

In terms of potential risks, the article briefly mentions that compliance can limit impact forces, which is important for an end-effector designed to establish contact with the world. However, it does not thoroughly discuss other potential risks or challenges associated with compliant hands, such as durability, wear and tear, or potential issues in handling delicate objects.

Overall, while the article presents an interesting concept and provides some evidence to support its claims, there are several biases and limitations that need to be considered. The lack of balanced reporting, limited experimental data, omission of comparative analysis with existing designs, and insufficient discussion on potential risks all contribute to a less comprehensive and objective assessment of the RBO Hand 2. Further research and experimentation are needed to fully evaluate its capabilities and address these limitations.

# Topics for further research:

* Comparative analysis of compliant robotic hands
* Limitations of passive compliance in dexterous grasping
* Experimental evaluation of force closure in compliant hands
* Durability and wear and tear of compliant robotic hands
* Handling delicate objects with compliant hands
* Challenges and risks associated with underactuated robotic hands

# Report location:

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