Cai Yuanpei 蔡元培. “Meishu yu kexue de guanxi” 美术与科学的关系 [The relation between art and science]. *Beijing daxue rikan* 北京大学日刊 (1921): 168-179.

Cai, Yuanpei[1], The Relation between Science and Art

Translated by Wendy Xue and Yuning Yan

我们心理上，可以分三方面看：一面是意志，一面是知识，一面是感情，意志的表现是行为，属于伦理学：知识属于各科学，感情是属于美术的，我们是做人，自然行为是主体，但要行为断不能撇掉知识与感情。例如走路是一种行为，但先探听；从那一条路走？几时可到目的地？采明白了，是有了走路的知识了；要是没有行路的兴会，就永不走，或走得不起动，就不能走到目的地。又如踢球的也是一种行为，但要先研究踢的方法；知道踢法了，是有了踢球的知识了；要是不高兴踢，就永踢不好。所以知识与感情不好偏枯，就是科学与美术不可偏废。

There are three aspects within our psychology: Will, knowledge and emotion[2]. Will is reflected in behaviour, which belongs to ethics. Knowledge comes from different branches of science, and emotions belong to art; It is natural that in conducting ourselves as human beings the main aspect that needs to be taken into account is behaviour, but we cannot forget the other two. For example, walking is a behaviour, but before walking you need to investigate things such as: which road we should take, and when we would arrive at the destination. Once we have investigated these questions thoroughly, we will have the knowledge of walking. However, if you do not feel like walking, you will never walk, or if you do not have motivation to walk somewhere, you will never get to the destination. Another example of behaviour is kicking a ball, but we need to first study the technique of kicking. We will have the knowledge of kicking a ball once we know how to kick. However, If you do not feel like kicking, you will never be good at it. Therefore we cannot favour one and ignore

[1] Cai Yuanpei was the leading liberal educator of early twentieth-century China, best known for serving as the first Minister of Education of the Republic of China in 1912. He also served as the President of Peking University, and the founder and first president of the Academia Sinica, China’s highest national research institute. He devoted his entire life to the causes of democratic revolution and modern education, and had distinguished himself for his major contribution in these fields. (See: Gao Pingshu. "Cai Yuanpei’s Contributions to China’s Science." In *Chinese Studies in the History and Philosophy of Science and Technology*, edited by Fan Dainian and Robert S. Cohen. Dordrecht: Springer, 1996) 395-417).

the other when it comes to knowledge and emotions, and the same goes for science and art.[3]

科学与美术有不同的点；科学是用概念的，美术是用直观的，譬如这里有花，在科学上讲起来，这是菊科的植物，这是植物这是生物，都从概念上进行。若从美术眼光看起来：这一朵菊花的形式与颜色觉得美观就是了；是不叫作菊花，都可不管。其余的菊科植物什么样？植物什么样？生物什么样？更可不必管了。又如这里有桌子，在科学上讲起来，他那桌面与四足的比例，是合于动学的理法的：因而推到各种形式不同的桌子，同是一种理法，而且与桌子相类的椅子镫子，也同是一种理法，因而推到屋顶与柱子的关系，也同是一种理法，都是从概念上进行。若从美术家眼光看起来；不过这一个桌面上纵横的尺度的比例得适当；四足粗细与桌面的大小厚薄，配置得也适当了。不必推到别的桌子或别的器具。但是科学虽然与美术不同，在各种科学上，都有可以应用美术眼光的地方。

There are differences between science and art; science is conceptual, and art is intuitive. For example, describing a flower from a scientific point of view, one would say that it was a plant that belongs to the Asteraceae family, conceptually defining it as a plant and as an organism.' However If you look at it from an artistic perspective, the shape and colour of this Chrysanthemum is pleasing to the eye, and it does not matter whether or not it is called Chrysanthemum. What are the other Asteraceae plants like? What are the plants like? What are the organisms like? All of these matter even less. Take tables as another example. Scientifically, the proportion of the surface and four legs conforms to the principles of kinematics. So regardless of the types of tables, as well as similar chairs and stools, the same theory applies. Consequently, the same theory can be applied to the relation between roofs and pillars. These can all be achieved conceptually. If we look at it from an artistic perspective, the tabletop merely needs to have a proper vertical and horizontal ratio, as well as a proper arrangement of thickness of the legs, size and thickness of its tabletop. There is no need to branch out to other tables or other apparatus. Although science is

[3] Cai was an intellectual who was one of the major driving forces of the 1919 May Fourth movement. To further his quest of promoting the "education of worldview" ("shijieguan jiaoyu" 世界观教育) and dethroning the traditional feudal education, he put forward the idea that "aesthetics" could be a key cure for that. (See: Vera Schwarcz. *The Chinese enlightenment: Intellectuals and the legacy of the May Fourth Movement of 1919*. Vol. 27. University of California Press, 1986, 48-49). In 1919, Cai stated "any kind of person, at all times, should have the opportunity to come in contact with art." This was seen as an ambitious goal and was eventually incorporated into the trend of Chinese education reform. (See: Cai Yuanpei, "Wenhua yundong bu yao wangle meiyu" 文化运动不要忘了美育 (The culture movement must not forget aesthetic education), 1919).

different from art, there are places where an artistic perspective can be applied in various sciences.

算术是枯燥的科学，但美术上有一类截金法的比例，凡长方形的器物，最合于美感的，大都途径与横径，总是三与五，五与八，八与十三：等比例。就是圆形，也是这样。

Arithmetic is a dull science, but in one type of art, the technique of *kirikane*[4] is used. All rectangular objects that mostly conform with aesthetics, have the width to length ratio of 3:5, 5:8, 8:13, and so on. This pattern applies to circles too.

形学的点线面，是严格没有趣味的，但是图案画的分子，有一部分竟是点与直线，曲线，或三角形，四方形，圆形等，凑合起来。又各种建筑或器具的形式，均不外乎直线，曲线的配置。不是很美观的么？

The point, line, and surface in geometry are strict and uninteresting, but a part of pattern painting, is surprisingly a combination of dots, straight lines, curves or triangles, squares, circles etc. In addition, the various shapes of buildings or tools, are still nothing more than the arrangement of straight lines and curves. Is it not beautiful?

声音高下，在声学上。不过一秒中发声器颤动次数的多少。但一经复杂的乐器，繁变的曲谱配置起来，就可以成为高尚的音乐。

The volume of sound in acoustics, is nothing more than the number of vibrations the sound device makes per second. But once a complex instrument is arranged with intricate sheet music, sound can become refined music.

色彩的不同的在光学上，也不过光线颤动迟速的分别。但是用美术的感情试验起来，红黄等色，叫人兴奋；蓝绿等色。叫人宁静。又把各种饱和或不饱和的颜色配置起来，竟可以唤起种种美的感情。

Also, the difference in colours in optics, is merely the difference in the vibration speed of light. But to approach them with artistic affect; red and yellow are exciting. Blue and green are calming. And arranging various saturated or unsaturated colours together, can even evoke various emotions that are beautiful.

[4] Japanese decorative technique used for Buddhist statues and paintings, using gold leaf, silver leaf, platinum leaf cut into lines, diamonds and triangles.

矿物学不过为应用矿物起见。但因此得见美丽的结晶，金类宝石类的光彩？很可以悦目。
Mineralogy is only for the purpose of using minerals. But the resulting beautiful crystals, as well as radiance from gold and various types of gems, can be very pleasing to the eye.

生物学，固然可知动植物构造的同异，生理的作用。但因此得见种种植物花叶的美，动物毛羽与体段的美。凡是美术家在雕刻上，图画上或装饰品上用作材料的，治生物学的人都时时可以遇到。
Biology admittedly shows the similarities and differences of the structures of animals and plants and their physiological functions . But as a result, it also sheds some light on the beauty of various plants and flowers, animal fur and feathers, as well as their contours. Scholars of biology constantly come across all the materials artists use for sculptures, paintings, or decorations.

天文学，固然可以知各种星体引力的规则，与星座的多寡。但如月光的魔力，星光的异态，凡是文学家几千年来叹赏不尽的, 有较多的机会可以赏玩。
We can certainly understand the rules of gravity for all sorts of celestial bodies, as well as the number of constellations through astronomy. However, there are many more opportunities to appreciate that which has been admired for by scholars of literature for thousands of years, such as the enchanting moonlight and twinkle of the stars.

照上头所举的例看起来，治科学的人，不但治学的余暇，可以选几种美术，供自己的陶养。就是所专研的科学上面，也可以兼得美术的趣味，岂不是一举两得么？
From the examples given above, people who study science not only can also choose several kinds of art for self-cultivation in their spare time. They can also find art interesting even from the science they specialise in. Is it not killing two birds with one stone?

常常看见专治科学不兼涉美术的人，难免有萧索无聊的状态。无聊不过，于生存上强迫的职务以外，俗的是借低劣的娱乐作消遣高的；是渐渐的成了厌世的神经病。因为专治科学，太偏于概念，太偏于分析，太偏于机械的作用了。譬如人是何等灵变，的东西？照单纯科学家眼光：解剖起来，不过几根骨头，几堆筋肉。化分起，不过几种原质。要是科学进步，一定可以制造生人，与现在制造机械一样。兼且凡事都逃不了因果律。
Oftentimes we see people who specialize in science but are not involved in art, inevitably it is hard to avoid a state of desolation without inspiration. When you are extremely

uninspired, other than the mandatory duties for survival, you disguise inferior entertainment as superior entertainment, which is vulgar. This is how you gradually become a misanthropic lunatic, because specialising in science is too conceptual, analytical and mechanical. For example, what kind of beings were humans transformed from? Purely from a scientist's point of view, anatomy is simply a few bones and piles of muscles, that are differentiated from simply a few original matters. If science advances, we can certainly manufacture humans, just as we do now with machines. In addition, nothing can escape the law of causation.

既如我今日在这里会谈，照极端的因果律讲起来，都可以说是前定的。我为什么此时到湖南？为什么今日到这个第一师范学校；为什么我一定讲这些话？为什么来听的一定是诸位？这都有各种原因，凑泊成功，竟没有一点自由的。就是一人的生死，国家的存亡，世界的成毁，都是机械作用，并没有自由的意志，可以改变他的。抱了这种机械的人生观与世界观，不但对与自己，竟无生趣。对于社会，毫无爱情；就是对于所治的科学，也不过「依样画葫芦，」决没有创造的精神。

For example, it can be assumed today's speech is predetermined in accordance to the law of causation to an extreme. Why am I in Hunan now? Why did I come to Hunan First Normal University today? Why must I say these words? Why must you be the ones who came here to listen today? There are various reasons for these questions. We managed to gather here today not because of free will. Even the life and death of a person, the survival of a country and the destruction of the world are all mechanical effects, and there is no free will to change them. If you hold such a mechanical outlook on life and the world, not only will you lose joy in life and passion for society, for the science you specialise in, all you do is drawing dippers with gourds as model,[5] and there is absolutely no spirit for innovation.

防这种流弊，就要求知识以外兼养感情；就是治科学以外，兼治美术。有了美术的兴趣，不但觉得人生很有意义，很有价值；就是治科学的时候，也一定添了勇敢活泼的精神。请诸君试验一试验。

To prevent this kind of impediment, we need to cultivate both knowledge and emotion. That is, to study art as well as science. Once we have interest in art, we will not only feel that life is meaningful and valuable, but also, you will have the spirit of courage and liveliness. even when we study science. Ladies and gentlemen, please give it a try.

[5] A Chinese idiom: To draw a dipper with a gourd as the model, meaning to slavishly copy. ("yi hulu hua piao"依葫芦画瓢) (See: Yu Jialou. *Dictionary of English Translation of Chinese Idioms*. University of Science and Technology of China Press, 1998, 688).

References

Edmund S.K. Fung. (2013). *Touches of History: An Entry into "May Fourth" China*, translated by Chen Pingyuan. *The China Journal*, 69 (2013): 240–242. https://doi.org/10.1086/668934

Gao Pingshu. "Cai Yuanpei's Contributions to China's Science." In *Chinese Studies in the History and Philosophy of Science and Technology*, edited by Fan Dainian and Robert S. Cohen, 395-417. Dordrecht: Springer, 1996.

Tang Lingyun 汤凌云. "1920 niandai zhongguo meiyu lilun jianshe de jiben tedian" 1920 年代中国美育理论建设的基本特点 [The fundamental features of the establishment of aesthetic education in China in the 1920s]. *Nantong daxue xuebao (jiaoyu kexue ban)* 南通大学学报(教育科学版) (2007): 52-56.

Vera Schwarcz. *The Chinese enlightenment: Intellectuals and the legacy of the May Fourth Movement of 1919*. Vol. 27. University of California Press, 1986. 48-49.

Yu Jialou 喻家楼. "hanyu chengyu ying yi cidian" 汉语成语英译词典 [Dictionary of English Translation of Chinese Idioms]. University of Science and Technology of China Press, 1998, 688.