

Science and Poetry

科學與詩

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“When it comes to atoms, language can be used only as in poetry. The poet, too, is not nearly so concerned with describing facts as with creating images.”

So said the 1922 Nobel Laureate in Physics, Niels Bohr (1885–1962), a Danish physicist who made significant contributions to the understanding of the atomic structure and the fundamental theory of quantum mechanics.

I, too, believe poems have a role to play in science and likewise science a role in poetry.

On a small scale, I consider myself a scientist. I see myself a fusion of theoretical engineer, applied mathematician and academic editor by profession, for the reason of holding a PhD degree in applied mathematics, being a chair professor in engineering, and having fifteen years experience in academic journal editing. On an even smaller scale, I have been considered an amateur poet because I like writing classical Chinese poems, though unlike my academic standing, I do not have any degree or any formal training in Chinese literature. The interaction of these two aspects of my life resulted in my literary foray to seek out aspiring minds and wisdoms through history so as to better understand and enhance my own quest and value.

I have always been amazed and appreciative of how poetry and science can inspire each other. Curiosity, imagination, exploration, critical thinking, creative writing and metaphor – elegant poems comprise many, if not all, of these fundamental elements essential to scientific discovery and research. Reciprocally, science provides so much motivation and inspiration to poetry, especially modern freestyle poetry. The two, science and poetry, are rooted in the same human spirit, inspiration and creativity, and share and reflect the same kinds of conceptual abstraction and natural beauty of the world.

There have been many geniuses, past and present, with great talents spanning science and poetry.

The enduring masterpiece *De Rerum Natura* (On the Nature of the Universe), written by the Roman poet Titus Lucretius Carus (99–55 BC), is an amazing example of curiosity and imagination that could extend the bounds of human knowledge and query what lay beyond the common senses and received wisdoms. In this didactic poem, which was later divided into six books, Lucretius argued that everything in the universe is composed of tiny atoms moving about in an infinite void, rather than being created by deities as was commonly believed in his time. Lucretius was an influential scientist with the profound perspective to see that all the visible motions of small particles reveal the presence of atoms. He somehow inspired Einstein's quantitative analysis of Brownian motion and was thus pivotal in encouraging the acceptance of the modern atomic theory by scientists such as Bohr.

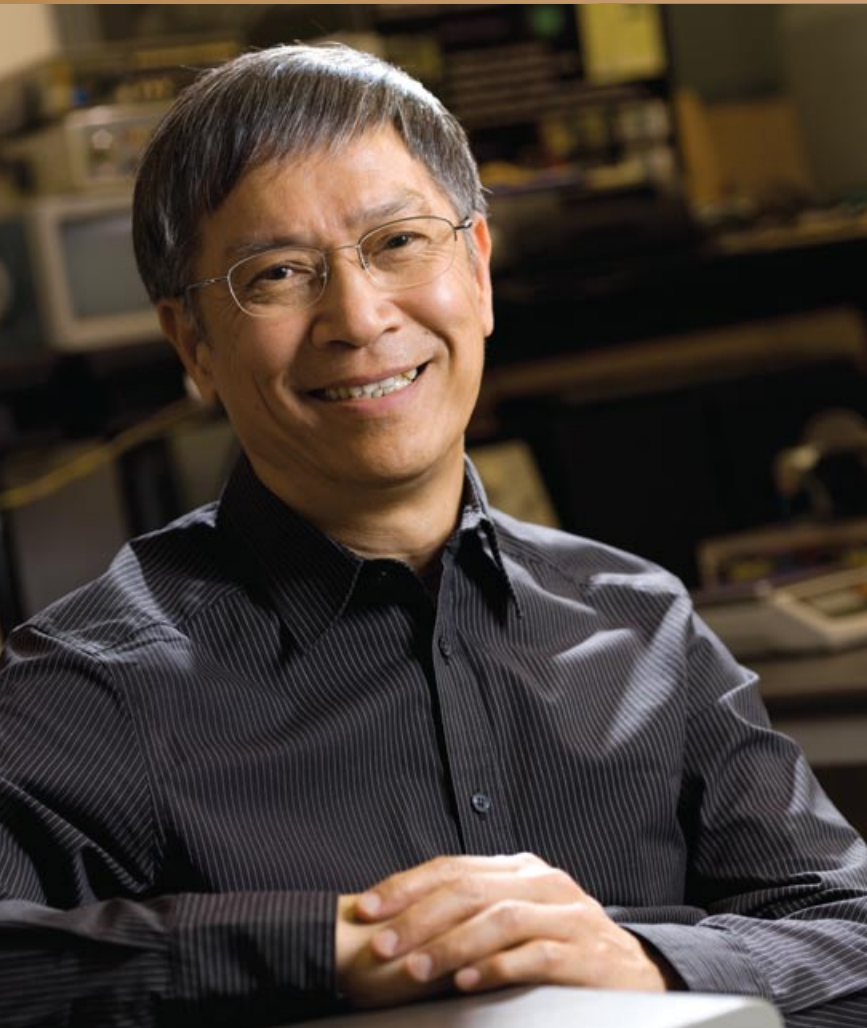
“Science and poetry, are rooted in the same human spirit, inspiration and creativity, and share and reflect the same kinds of conceptual abstraction and natural beauty of the world.”

Since the time of Lucretius in ancient Italy, there has been a strong tradition of exchange between poetry and science, subsequently producing many “two-in-one” scientist-poets, or poet-scientists. Today, most people typically pursue one route while being oblivious to the other, believing a poet is never a scientist and a scientist is never a poet. One might not realise that reading a well-written new scientific paper that opens up a new research direction is very much the same as reading an enlightening poem. In addition to enjoyment, you are always led to wonder and ponder as to where it will guide you next.

In the eastern world, there were also many great scholars in the ancient times. Omar Khayyám (AD 1048–1131) is perhaps one of the best-known.

He was a Persian polymath, mathematician, philosopher, astronomer, and physicist. But above all, Khayyám was distinguished as a great poet. He left a collection of famous verses, *Rubáiyát*, of which reportedly one can find around 500 different translated versions in the New York Public Library alone. He was also a mathematician famous for his influential monograph *Risālahi' l-barāhīn 'alā masā il al-jabr wa'l-*

muqābala (Treatise on Demonstration of Problems of Algebra), published in 1070 when he was 22 years old and eventually translated to Europe. It laid down the principles of modern algebra. As an astronomer, Khayyám calculated the length of the solar year to be 365.24219858156 days, which was more accurate than the Gregorian calendar formulated 500 years later during the reign of Pope Gregory XIII (1502–1585).



In China, we have many famous scientists and poets throughout some 5,000 years of history, from as far back as the first collection of Chinese poems, *Book of Songs* around 1046–771 BC. More notably, Confucius (551–479 BC) said: “If you don’t study poetry, you won’t have words to present”. Ancient Chinese education emphasised the integration of science and literature. During the Western-Han dynasty (206 BC–AD 25), all schools required students be able to master Six Arts, namely etiquette, music, archery, equestrian, literature and arithmetic. As a result, there appeared many poet-scientists who contributed significantly to the civilisation in China and beyond. To name just one in the ancient times, Zhang Heng (139–78 BC) was an all-rounded scientist responsible for great achievements in astronomy, seismology, mechanics, mathematics, as well as literature and poetry. He invented the world’s first celestial globe, seismoscope, multi-level engraved-leakage timer, and other scientific instruments. He improved the circle’s circumference-diameter ratio to be the square root of 10, fairly close to the more accurate result of 355/113 obtained by another Chinese poet-scientist Zu Chongzhi (AD 429-500), 500 years later. Moreover, he left behind a valuable collection of classical paintings, essays and poems. Indeed, examples like Zhang Heng are many.

Historical exceptions notwithstanding, why do we still delineate so strongly between science and poetry today? Well, I believe they are mutually beneficial. To me, life is more enjoyable practicing both and would be quite boring if I had only one in which to indulge. ●

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「描述原子理論需要用詩一般的語言；詩人的想像通常比寫實更為豐富。」

這句話引自1922年諾貝爾物理獎得主、丹麥物理學家尼爾斯·玻爾（1885-1962）。眾所周知，玻爾為人類對原子結構的認知和在量子力學方面做出過奠基性的貢獻。

我也相信，詩在科學中扮演着重要的角色，而科學對詩的影響更是功不可沒。

雖然絕對沒有把自己和科學家及詩人放在一起談論的意思，但是用一個恰當的尺度來衡量，耳順之年的我畢竟找到一個「理論工程、應用數學及學術編輯」三位一體的職業歸宿。原因十分簡單：曾經獲得應用數學博士學位，目前是工程學院講座教授，並且當了十五年學術編輯。在一個更低的層次，我經常被別人稱為是一個業餘詩客，無非是因為我喜歡寫一些古體詩詞。其實我不但沒有文學學位而且連正規文學訓練都不曾有過。不管如何，這個背景也許就成了我試圖提升自己對文學中深邃智慧和光輝思想的理解和認知的動力，也為我在這裏奢談「科學與詩」提供了原因和根據。

我向來都為科學與詩竟然可以相互啟發靈感而驚嘆不已。好奇心、想像力、超越性思維、創造性寫作，甚至遐想及暗喻，這些寫詩的基本功夫幾乎全部都是科學研究與發現所必不可少的。反過來，科學為詩、特別是現代自由體詩歌提供了源源不絕的動力與素材。事實上，科學和詩都源於相同的人類精神、靈感和創造力，追求並享受同一世界的美好抽象與優雅本質。

放下當今的著名人物不說，歷史上就曾經有過許許多多二位一體的天才。

古羅馬詩人提圖斯·盧克萊修·卡魯斯（公元前99-55）的一首世代流傳、享譽天下的詩篇「大自然中的宇宙」為後人提供了一個光輝典範：詩人充滿好奇的內心世界中，蘊含着超越當時人類知識範疇和邊界的科學認知和哲理。那首長詩後來分成六冊，其中盧克萊修闡述了原子存在與物質運動的形式，以及宇宙的時間與空間的兩個側面，有別於當時人們信奉的造物主創世說。他的原子論觀點很可能啟發了愛因斯坦對布朗運動的非凡定性分析，以及像波爾那樣的科學家對現代原子理論的接納、詮釋和發展。

繼盧克萊修之後，詩與科學的相互結合和滲透形成古代意大利非常強烈的文化色彩和傳統，並為許多睿智過人的學者大師所繼承，其中不乏完美無瑕的二位一體詩人科學家，或者科學家詩人。今天，一般人只知道也只樂於追求其中一個目標：不是鑽研科學就是創作詩歌。其實人們時常都已經體會到，閱讀一篇讓人在一個嶄新研究方向上豁然開朗、寫得文采飛揚的科學論文，和閱讀一篇動人肺腑的詩篇時的感覺和享受是非常相似的。行文中值得欣賞的很多共同點自然不必細說，您常常還會有「山重水複疑無路，柳暗花明又一村」的驚喜和收穫。

東方世界在古時候亦不乏智者能人。歐瑪爾·海亞姆（1048-1131）可能是最為傑出的一位。這位十一世紀的波斯人，是一位集數學、哲學、天文、物理於一身的大科學家，更是一位偉大詩人。他那本流芳百世的詩集《魯拜集》，據說單在紐約圖書館就有不同文字的五百多種譯本。他也是當時的著名數學家，以一部影響深遠的代數問題解釋專著 *Risālahīl-barāhīn'alā masā il al-jabr wa'l-muqābala* (Treatise on Demonstration of Problems of Algebra) 而載入數學史冊。該書於1070年他22歲時出版，最終傳入歐洲，為現代代數學奠定了基礎。作為一個天文學家，海亞姆測算出一個太陽年的時間長度為365.24219858156天，比五百年後教皇格列高利十三世（1502-1585）開始採用的國際西曆還要精確。

在中國五千多年文化歷史長河中，我們有過許多著名詩人學者，至少可以從第一部詩集《詩經》（公元前1046-771）說起。孔子（公元前551-479）亦曾經說過：「不學詩，無以言。」中國教育在歷史上曾經一度非常注重科學與文學的相互結合。在西漢時期（公元前206-公元25），學校要求學生須懂「六藝」，即：禮、樂、射、御、書、數。這種通才式的教育後來也確實產生過不少全面發展的文豪、詩人、哲學家、科學家，其中典型的一位詩人科學家是張衡（公元前139-78）。他才華橫溢，天文地理、琴棋書畫無所不通。他創造了「渾天儀」、「地動儀」、「多級刻漏計時器」以及多種轉動和傳動機械裝置；他把圓周率的計算細化到10的平方根，與五百多年後另一位詩人科學家祖沖之（公元429-500）得出的更為精確的結果355/113 非常接近；他還為後人留下了許多寶貴的繪畫、散文和詩賦。在中國歷史上，像張衡這樣的詩人科學家並不罕見。

世界歷史上的詩人科學家例子多不勝數。但為何今天我們還要把科學和詩歌相提並論呢？簡而言之，科學和詩學是相互輝映的兩門學問；而對於我自己來說，實踐兩者比專攻其一會使個人生活更為充實、也更加豐富多彩。 ●