This can then be compared to the coefficients of $W(A \cdot B)$ which were

$$\begin{aligned}
\psi(A) &= a_1^1 b_1^1 + a_1^2 b_2^1 + a_1^1 b_1^2 + a_1^2 b_2^2 + a_2^1 b_1^1 + a_2^2 b_2^1 + a_2^1 b_1^2 + a_2^2 b_2^2 \\
\psi(V) &= a_1^1 b_1^1 + a_1^2 b_2^1 - a_1^1 b_1^2 - a_1^2 b_2^2 + a_2^1 b_1^1 + a_2^2 b_2^1 - a_2^1 b_1^2 - a_2^2 b_2^2 \\
\psi(H) &= a_1^1 b_1^1 + a_1^2 b_2^1 + a_1^1 b_1^2 + a_1^2 b_2^2 - a_2^1 b_1^1 - a_2^2 b_2^1 - a_2^1 b_1^2 - a_2^2 b_2^2 \\
\psi(D) &= a_1^1 b_1^1 + a_1^2 b_2^1 - a_1^1 b_1^2 - a_1^2 b_2^2 - a_2^1 b_1^1 - a_2^2 b_2^1 + a_2^1 b_1^2 + a_2^2 b_2^2
\end{aligned}$$

Notice that $W(A) \cdot W(B) = W(A \cdot B)$, in the case of 2×2 matrices.